October 1982
vol 8, no 10
$2.95

creative computing

the #1 magazine of computer applications and software

A PRACTICAL GUIDE TO COMPUTERS IN EDUCATION

Pilot to Basic Translator

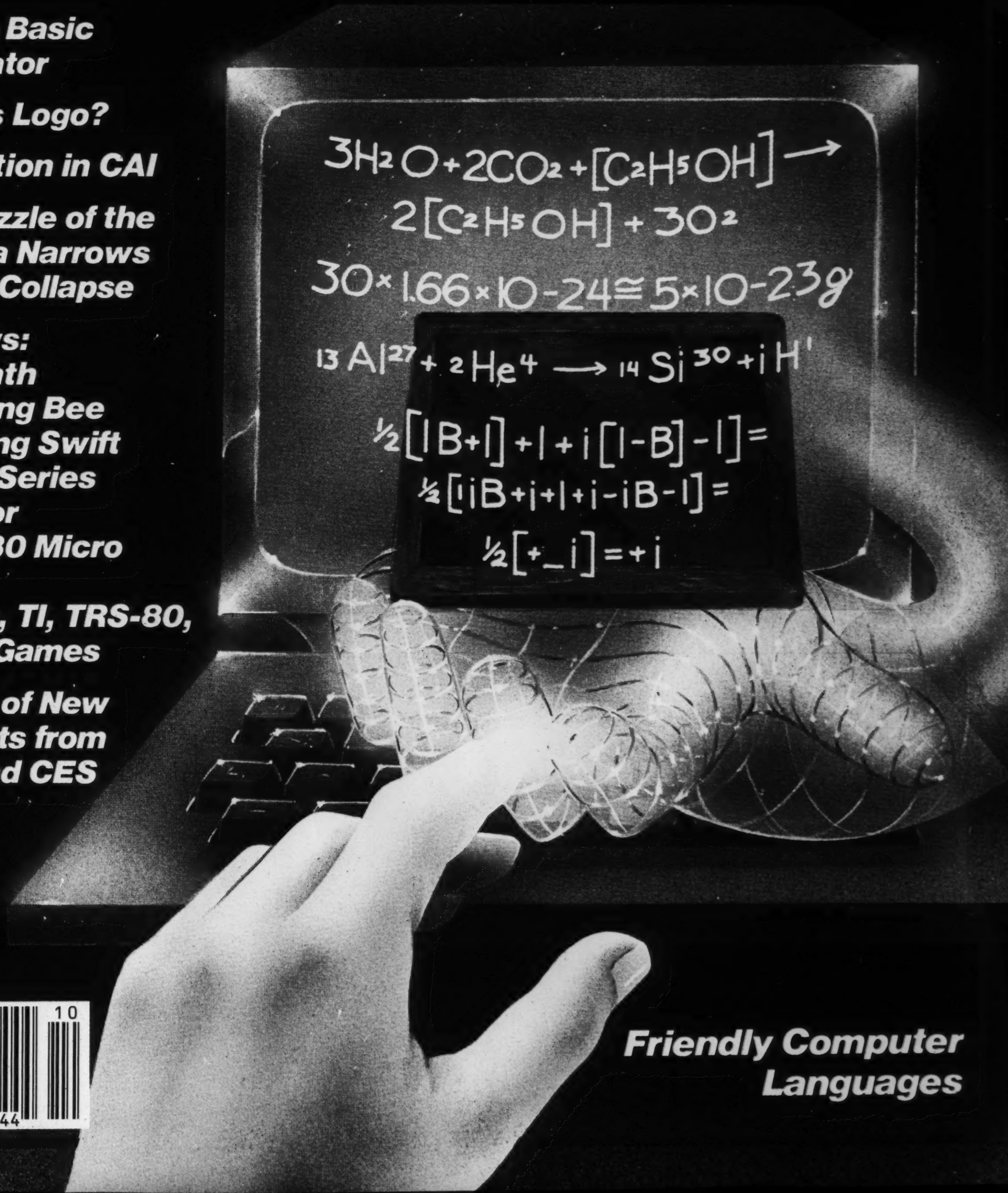
What is Logo?

Motivation in CAI

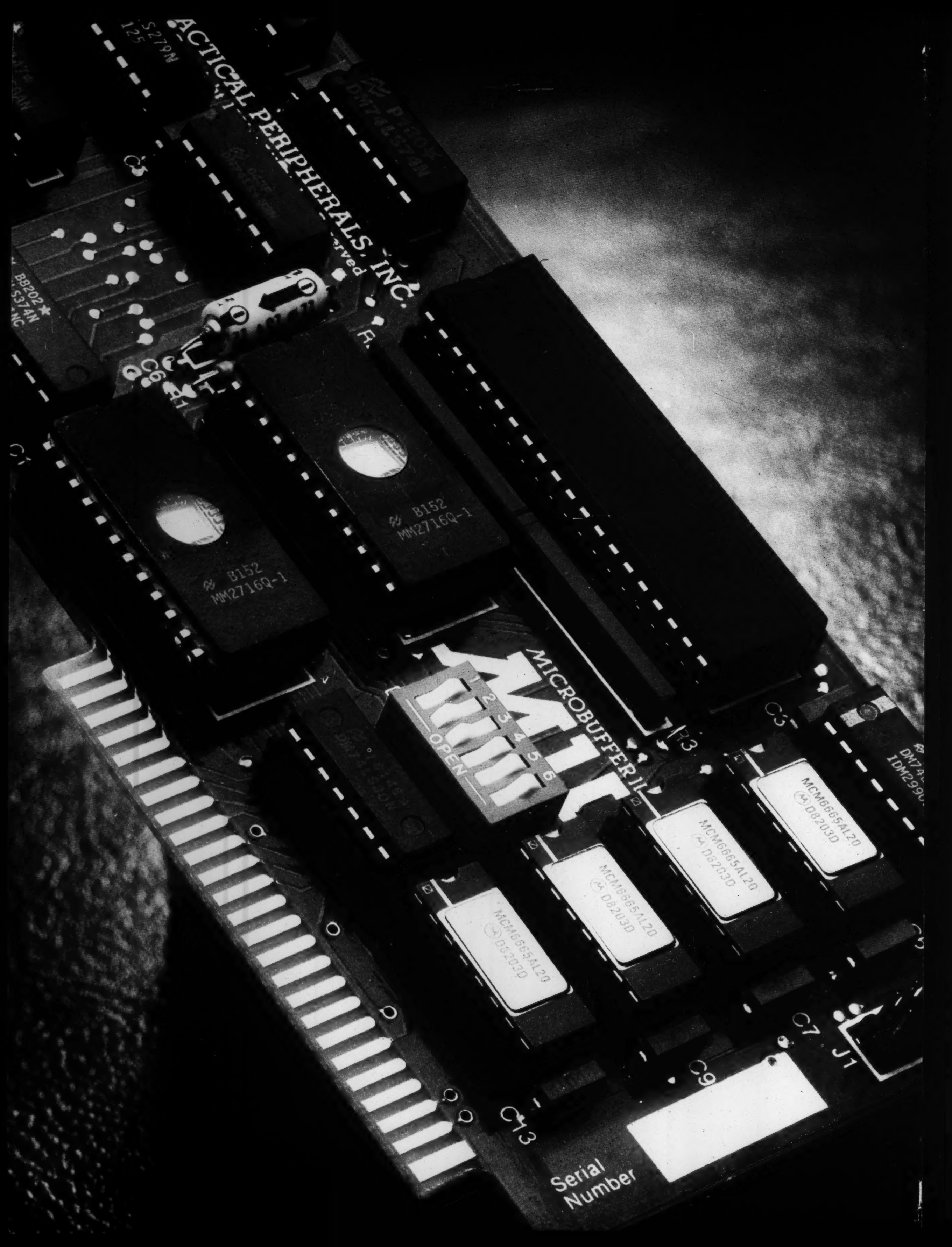
The Puzzle of the Tacoma Narrows Bridge Collapse

Reviews:
- MuMath
- Spelling Bee
- Sterling Swift Math Series
- Mentor
- TRS-80 Micro Pilot
- Apple, TI, TRS-80, Atari Games

Scores of New Products from NCC and CES


$3H_2O + 2CO_2 + [C_2H_5OH] \rightarrow$
$2[C_2H_5OH] + 3O_2$
$30 \times 1.66 \times 10 - 24 \cong 5 \times 10 - 23g$
$_{13}Al^{27} + {_2}He^4 \longrightarrow {_{14}}Si^{30} + {_1}H^1$
$\frac{1}{2}[1B+1] + 1 + i[1-B] - 1] =$
$\frac{1}{2}[iB+i+1+i-iB-1] =$
$\frac{1}{2}[+\_i] = +i$

Friendly Computer Languages


ACTICAL PERIPHERALS, INC.
MICROBUFFER II
B152
MM2716Q-1
B152
MM2716Q-1
MCM6665AL20
D8203D
OPEN
1 2 3 4 5 6
C3
C6
C7
C9
C13
R3
J1
Serial Number

MICROBUFFER WILL SPEED UP ANY PROGRAM THAT REQUIRES PRINTING.

MICROBUFFER ALLOWS YOU TO PRINT AND PROCESS SIMULTANEOUSLY.

Now you don't have to wait for the printer to finish before you can use your computer again.

YOU CAN DUMP PRINTING DATA DIRECTLY TO MICROBUFFER.

Unlike your printer, Microbuffer accepts data as fast as your computer can send it. So there's never a bottleneck.

Microbuffer first stores the data in its own memory buffer and then takes control of your printer. This frees the computer for more productive functions.

Additional output may be dumped to the buffer at any time and it will be printed in turn.

THERE IS A MICROBUFFER FOR ANY PRINTER/COMPUTER COMBINATION.

Microbuffers are available in Centronics-compatible parallel or RS-232C serial versions.

FOR APPLE II COMPUTERS, Microbuffer II features on-board firmware for text formatting and advanced graphics dump routines. Both serial and parallel versions have very low power consumption. Special functions include Basic listing formatter, self-test, buffer zap, and transparent and maintain modes. The 16K model is priced at $259 and the 32K, at $299.

FOR EPSON PRINTERS, Microbuffer is $159 in either an 8K serial or a 16K parallel version. The serial buffer supports both hardware handshaking and XON-XOFF/ETC-ACK software handshaking at baud rates up to 19,200. Both Epson interfaces are compatible with all Epson commands including GRAFTRAX-80 and GRAFTRAX-80+.

ALL OTHER PRINTER/COMPUTER COMBINATIONS are served by the in-line, stand-alone Microbuffers. Both serial and parallel versions are expandable up to 256K. The serial stand-alone will support different input and output baud rates and handshake protocol. The 32K model starts at $299, 64K for $349. 64K add-ons for up to a total of 256K are just $179.

When you think of how much time Microbuffer will save, can you afford to *not* have one?

SIMPLE TO INSTALL.

Microbuffer II is slot-independent. It will fit directly inside the Apple II in any slot except zero.

Microbuffer for your Epson mounts easily in the existing auxiliary slot directly inside the printer.

The stand-alone Microbuffer is installed in-line between virtually any printer and computer.

MICROBUFFER FROM PRACTICAL PERIPHERALS.

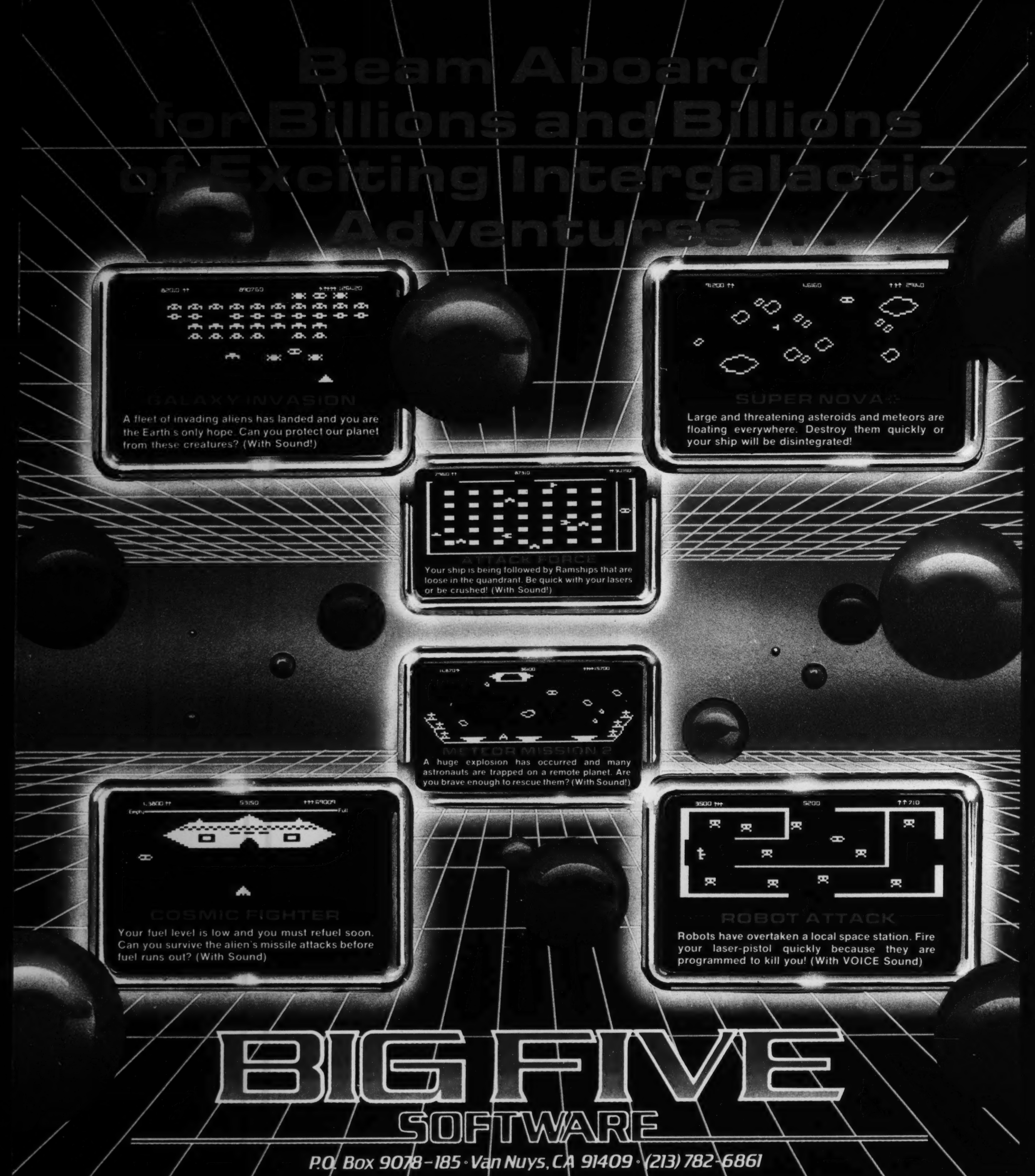
Practical Peripherals is dedicated to establishing new industry standards for product performance.

The un-retouched photo at left has been enlarged to demostrate Microbuffer's exact workmanship and precise attention to detail. Specifications demand that each board undergo 36 seperate tests and inspections before it can leave the factory.

Ask your dealer for a demonstration of the most practical, most successful new product of the year — Microbuffer.

PRACTICAL PERIPHERALS, INC.
31245 LA BAYA DRIVE
WESTLAKE VILLAGE, CA 91362
(213) 991-8200

CIRCLE 242 ON READER SERVICE CARD


Beam Aboard for Billions and Billions of Exciting Intergalactic Adventures . . .
BIG FIVE
SOFTWARE

GALAXY INVASION

A fleet of invading aliens has landed and you are the Earth's only hope. Can you protect our planet from these creatures? (With Sound!)

SUPER NOVA✲

Large and threatening asteroids and meteors are floating everywhere. Destroy them quickly or your ship will be disintegrated!

ATTACK FORCE

Your ship is being followed by Ramships that are loose in the quandrant. Be quick with your lasers or be crushed! (With Sound!)

METEOR MISSION 2

A huge explosion has occurred and many astronauts are trapped on a remote planet. Are you brave enough to rescue them? (With Sound!)

COSMIC FIGHTER

Your fuel level is low and you must refuel soon. Can you survive the alien's missile attacks before fuel runs out? (With Sound)

ROBOT ATTACK

Robots have overtaken a local space station. Fire your laser-pistol quickly because they are programmed to kill you! (With VOICE Sound)

P.O. Box 9078-185 · Van Nuys, CA 91409 · (213) 782-6861

CIRCLE 120 ON READER SERVICE CARD

Prices per Game: TRS-80 16K Lev2 Mod1 / Mod3 Cassette —	$15.95
TRS-80 32K Lev2 Mod1 / Mod3 Diskette —	$19.95
Optional Joystick for Model 1 —	$39.95

10% discount for 2 items, 15% for 3 or more.

Please add $1.75 per order for postage & handling, Calif. residents add 6% sales tax.

Outside USA (except Canada) please add $3.00 per order for postage & handling.

All Games 1980, 1981 by Bill Hogue & Jeff Konyu.

Programs are written in machine language for high quality graphics & sou effects.

Voice & other sound effects are playable through the cassette AUX plug.

High scores are automatically saved after each game on disk versions.

Call or write for our complete catalog.

✲Audiovisual licensed from Atari.

in this issue...

evaluations & profiles

8 **Elementary Mathematics** .... *Fox*

14 **Factoring Whole Numbers** .... *Coan*

18 **Quiz Time In The Classroom** .... *Fox*
Spelling Bee and Math Competency

26 **MuMath** .... *Shochat*

34 **TRS-80 Micro Pilot** .... *Hardy & Effner*

38 **Mentor** .... *Glenn*
Apple CAI authoring system

55 **Friendly Computer Languages** .... *Muller*
A look at several versions of Logo and Pilot

65 **TI Munch Man** .... *Cashman*

66 **Apple Arcade Games** .... *Ahl*

89 **Dungeons and Asteroids** .... *Small*
Warlock's Revenge and Kayos

92 **TRS-80 Games** .... *Linzmayer & McCracken*

articles

100 **Puzzle of the Tacoma Narrows Bridge** *Zollman & Fuller*
An innovative approach to teaching physics

111 **Logo Ideas** .... *Lawler*

112 **What Is Logo?** .... *Watt*
A teacher offers some answers

134 **The Role of Motivation in CAI** .... *Swenson & Anderson*

140 **How To Solve It** .... *Piele*
Problem solving contest results

155 **The Summer Show Circuit** .... *Ahl*
Report on NCC and CES

186 **The Handicapple** .... *McConnell*
A low cost Braille printer

190 **Who Really Invented the Video Game?** .... *Anderson*
A *Creative Computing* exclusive

198 **Add a Joystick to Your TRS-80** .... *Stanis & Ahl*

202 **Joytricks** .... *Anderson*
Controller modifications for Atari computers and VCS

210 **Introduction to Data Structures** .... *Mitchell*
Searching techniques

296 **The Big Whoops** .... *Payack*

applications & software

226 **Pilot-to-Basic Translator** .... *Smith*

238 **Demonstrating The Gas Laws** .... *Holko*
A chemistry experiment

242 **Animath** .... *Wright & Ollman*
Drill and practice with the Atari

250 **Mortgage Amortization** .... *Green*
How much will it cost?

252 **Double Cross** .... *Johnston*
A Basic double-crosstic

260 **Valley Bomber** .... *Basham*
Destroy the valley, but not the mountains

departments

6 **Input/Output** .... *Readers*

17 **Notices** .... *Fee*

132 **Dateline: Tomorrow** .... *Ahl*

262 **The Other Side** .... *Kewney*
Notes from the UK

264 **The Graph Paper** .... *Lubar*
Part four: the end of the beginning

270 **IBM Images** .... *Fastie*
Graphics and speculation

284 **TRS-80 Strings** .... *Gray*
Graphics, DOSes, and help numbers

298 **Personal Electronic Transactions** .... *Yob*
Games, CP/M, and more

304 **Book Reviews** .... *Gray, et al.*
Six books for home and classroom

308 **Retail Roster** ....

312 **Classified** ....

314 **Index to Advertisers** ....

October, 1982
Volume 8, Number 10

BPA MEMBER MIIA

Creative Computing (ISSN 0 097-8140) is published monthly by Ahl Computing, Inc., a subsidiary of Ziff-Davis Publishing Company. David Ahl, President; Elizabeth B. Staples, Vice President; Selwyn Taubman, Treasurer; Bertram A. Abrams, Secretary. P.O. Box 789-M Morristown, N.J. 07960. Second Class postage paid at New York, NY 10001 and at additional mailing offices.

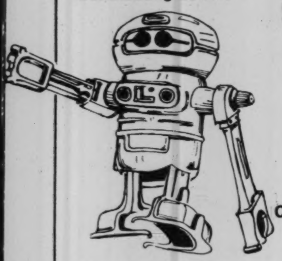
Copyright ©1982 by Ahl Computing, Inc. All rights reserved.

Editorial offices located at 39 East Hanover Ave., Morris Plains, NJ 07950. Phone (201) 540-0445.

Domestic Subscriptions: 12 issues $24.97; 24 issues $43.97; 36 issues $57.97. POSTMASTER: send address changes to Creative Computing, P.O. Box 5214, Boulder, CO 80321. Call 800-631-8112 toll-free (in New Jersey call 201-540-0445) to order a subscription.

staff

Editor-in-Chief	**David H. Ahl**
Editor	**Elizabeth B. Staples**
Managing Editor	**Peter Fee**
Technical Editor	**Michael Coffey**
Associate Editor	**John Anderson**
Contributing Editors	**Dale Archibald** **Charles Carpenter** **Thomas W. Dwyer** **Will Fastie** **Stephen B. Gray** **Glenn Hart** **David Lubar** **Guy Kewney** **Stephen Kimmel** **Ted Nelson** **Harold Novick** **Peter Payack** **David Small** **Alvin Toffler** **C. Barry Townsend** **Gregory Yob** **Karl Zinn**
Editorial Assistants	**Andrew Brill** **Karyn Hecht**
Secretary	**Elizabeth Magin**
Production Coordinator	**Christina L. Erickson**
Art Director	**Susan Gendzwil**
Assistant Art Director	**Chris DeMilia**
Artists	**Diana Negri Rudio** **Candace Figueroa** **Yukiko Sakai** **Eugene Bicknell**
Typesetters	**Karen K.Brown** **Renea C. Cole**
Advertising Director	**Jeff Weiner**
Creative Computing Press	**Laura Conboy** **Claudette Moore**
Software Development	**Kerry Shetline** **Eric F. Wolcott** **Owen Linzmayer** **Neil Radick** **Chris Vogeli**
Software Production	**Bill Rogalsky** **Nick Ninni** **Mary Ellen Mendl** **Mark Levitt**
Operations Manager	**William L. Baumann**
Comptroller	**Patricia Kennelly**
Accounting	**Jennifer H. Shaler**
Bookkeeping	**Ethel Fisher**
Retail Marketing	**Jennifer Burr** **Laura Gibbons**
Fulfillment	**Frances Miskovich** **Rosemary Bender** **Linda Blank** **Pat Champion** **Susan DeMark** **Moira Fenton** **Elsie Graff** **Gail Harris** **Linda McCatharn** **Bridget Maher** **Joanne Sapio** **Carol Vita** **Barbara Werry** **Jim Zecchin**
Shipping & Receiving	**Ronald Antonaccio** **Mark Archambault** **Bill Thomas** **Scott McLeod** **Mike Gribbon**



advertising sales

Advertising Director
Jeff Weiner
Creative Computing
Ziff-Davis Publishing Company
One Park Avenue
New York, NY 10016
(212) 725-7957

Advertising Coordinator
Ruth Darling
Creative Computing
Ziff-Davis Publishing Company
One Park Ave.
New York, NY 10016
(212) 725-3446

Northern California, Northwest
Jules E. Thompson, Inc.
1290 Howard Ave., Suite 303
Burlingame, CA 94010
(415) 348-8222

Southern California, Southwest
Jules E. Thompson, Inc.
2560 Via Tejon
Palos Verdes Estates, CA 90274
(213) 378-8361

New England
CEL Associates, Inc.
27 Adams Street
Braintree, MA 02184
(617) 848-9306

Midwest
The Pattis Group
4761 W. Touhy Ave.
Lincolnwood, IL 60646
(312) 679-1100

Mid-Atlantic
Jim Herring
Ziff-Davis Publishing Company
One Park Ave.
New York, NY 10016
(212) 725-3452

Southeast
Browning Publications
P.O. Box 81306
Atlanta, GA 30366
(404) 455-3430

Canada
The Pattis Group
1623 Yonge St.
Toronto, Ontario M4T 241
(416) 482-6288

microform

Creative Computing is available on permanent record microfilm. For complete information contact University Microfilms International, Dept. F.A. 300 North Zeeb Road, Ann Arbor, MI 48106, or 18 Bedford Road, London WC1R 4EJ. England, and Micro Photo Division of Bell & Howell Company, Old Mansfield Road, Wooster, OH 44691.

where to send it

All **editorial material**, including article submissions, press releases, and products for evaluation should be sent to:
Creative Computing
39 E. Hanover Ave.
Morris Plains, NJ 07950

Correspondence regarding other Creative Computing products and publications should also be sent to the Morris Plains address.

Correspondence related to **advertising**, including ad copy, questions on billing, and requests for rates, should be sent to:
Advertising Department
Creative Computing
Ziff-Davis Publishing Co.
One Park Ave.
New York, NY 10016

Correspondence regarding **subscriptions**, including orders, changes of address, and problems should be sent to:
Creative Computing
P.O. Box 5214
Boulder, CO 80321

Your help in choosing the correct address for your correspondence is appreciated. An incorrectly addressed letter or package can take as long as several weeks to reach its proper destination.

subscriptions

All subscriptions orders and other correspondence related to subscriptions should be addressed to:
Creative Computing
P.O. Box 5214
Boulder, Colorado 80321.

Foreign subscriptions must be accompanied by payment in U.S. currency.

Subscription prices:

U.S.		**Canada**		**Foreign**	
1 year	$24.97	1 year	29.97	1 year	34.97
2 years	43.97	2 years	53.97	2 years	63.97
3 years	57.97	3 years	72.97	3 years	87.97

Airmail delivery on foreign subscriptions is available for a one-year period only at **$75.00** additional for mail to Asia and Australia, and **$50.00** additional for all other foreign.

Subscribers in the United Kingdom may send payment in sterling to:
Hazel Gordon
27 Andrew Close
Stoke Golding
Nuneaton, CV13 6EL

Please allow at least eight weeks for change of address. Include old address as well as new—enclosing if possible an address label from a recent issue.

attention authors

Creative Computing will not be responsible for the return of unsolicited manuscripts, cassettes, floppy disks, program listings, etc. not submitted with a self-addressed, stamped envelope.

maxell
THE
GOLD
STANDARD

In an age when new standards are constantly emerging, one disk consistently meets or exceeds them all.

Maxell. The Gold Standard.

Not all disks are created equal. Some are better than others. To find out what's best for you, look for Maxell disks. They now carry the Gold Standard symbol of quality. It's your assurance Maxell disks meet or exceed every definition of quality. No matter who establishes it. We've earned this universal superiority by never relaxing our uniquely demanding quality control. Every aspect of manufacturing is checked, then checked again.

Your benefits are many. Take the perpetual problem of drop-outs. A drop-out is a tiny defect that wastes time and degrades computer accuracy and performance. Now that you understand what a drop-out is, forget it. Maxell disks don't have any. Each disk comes to you certified drop-out free at the time of manufacture. You can depend on this quality protecting your valuable programs and programming time, indefinitely. We've run disks over ten million passes under conditions designed to find weak points and wear. We couldn't. And you won't.

maxell
Floppy Disk
FD1
maxell
MD1
maxell
Floppy Disk
FH2

There is a Maxell disk for the floppy system you use, or plan to use. Check your computer's instructions. Or write for our complete, highly informative brochure.

When you set the Gold Standard as your level of quality, you'll benefit from improved disk performance, immediately. Bank on it.

maxell®

Maxell Computer Products Division, 60 Oxford Drive, Moonachie, N.J. 07074, 201-440-8020

CIRCLE 198 ON READER SERVICE CARD

Intelligential Intelligibility

Dear Editor:

I loved the program in the June 1982 *Creative Computing* "Machine Intelligence: A Function of Human Ingenuity" by C.J. Georgiou. There were, however, a couple of typographical errors:

```
960 IF(V >0) and V <=N) GOTO 980
1140 IF B=1 THEN Q1=0
```

For those of your readers who have personal computers with 80 characters (I have the Super Pet) I have made the following adjustments

```
110 DIM H(20,20), A(8), B(8)
151 PRINT "BE PATIENT IT TAKES TIME!"
152 PRINT
153 PRINT "TO CHECK WEIGHTS IN PROGRESS
     PRESS < RUN/STOP >FOLLOWED BY GOTO 1600"
154 PRINT
160 INPUT "ENTER SIZE OF BOARD< UP TO 20 >," N
780 PRINT "----------": PRINT
1635 IF N = 20 THEN 1650
1640 PRINT delete second PRINT
delete lines 1670 —1720 Replace with
1670 S1$ = STR$(S1)
1680 S2$ = "    " + S1$               (4 spaces)
1690 PRINT RIGHT$(S2$,4);
1805 PRINT
1810 INPUT "TRY AGAIN";Q$
1820 IF "Y" = LEFT$(Q$,1) THEN 160
1830 END
```

S.L. Tuohy
748 Midland Rd.
Oradell, NJ 07649

Teed at Coffey

Dear Editor:

As an avid reader of *Creative Computing*, I find the software evaluations most informative. However, I feel I must comment on Michael Coffey's review of *GraForth II*, "A Graphic Language That's Downright Forthright," which appeared in the July issue.

Mr. Coffey mentions the ability to add new words (commands) to *GraForth* as a method to personalize the language. This is belittling one of the most powerful capabilities of Forth-like languages. If this capability were available in Basic, it would be used for more than just giving PRINT the pseudonym of P. In Forth-like languages, one builds commands until the final command built is the finished program. The capabilities of this type of system is awesome.

Another area where I must differ with Mr. Coffey is in the area of printer support and paddle support. In the documentation for *GraForth* supplied by Insoft there is a word (program) called PRINT.BUFFER which will print text for

Another area where I must differ with Mr. Coffey is in the area of printer support and paddle support. In the documentation for *GraForth* supplied by Insoft there is a word (program) called PRINT.BUFFER which will print text for

the user. I have used this word, which is only ten lines long, with great success. I have even added it to the basic list of words available in *GraForth*. (Additions to the language can be permanent). Paddle support is also provided by Insoft in the form of the word PADDLE, a three line program.

Additional areas which should be mentioned are sound generation and documentation. *GraForth* has a quite good and easy to use sound generator. Seven different voices are available.

The documentation which comes from Insoft is superb and will get a user up and running shortly after ripping open the package. The quality of the documentation should have received some comment for the review to be complete.

I feel that omitting the areas mentioned above is slighting an excellent product unfairly. Having used GraForth for the last month and a half, I have found coding in the language a joy.

John-Francis Mergen
823 Quince Orchard Blvd. #34
Gaithersburg, MD 20878

Grafix

Dear Editor:

Please note this error in your July 1982 issue:

In the "Graphics Package for the Apple II" by Christopher Hansen on p. 112, there is an error in line 10670. The variable in line 10670, which is shown as C, should be C$.

Otherwise the program runs fine.

Keep up the good work—love your magazine and my Apple II.

Bob Baker
2 High Grove Rd.
S. Yarmouth, MA 02664

Let's Get Normal

Dear Editor:

In the April 1982 *Creative Computing* page 176 Marvin Weingast suggests an interesting method for approximating a normal distribution. Unfortunately his program does not do what he describes. He says, for example, 12.35% of the time X=1.5*(A+B-1) where A and B are uniformly distributed random variables which vary from 0 to 1. But in the program line 50 he uses A to determine the times when this formula should be used. Thus to get to X=1.5*(A+B-1) A must be between .8765 and 1. B still varies between 0 and 1. The resulting distribution is quite different from that intended.

The variable used for the test must be independent of the values used in the functions.

To correct the program:

In line 30 Add D=RND(1)

Change Lines 40 and 50 to read

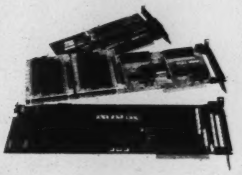
```
40 IF D< .8765 THEN X=2*(A+B+C-1.5)
50 IF D= >. 8765 THEN X=1.5*(A+B-1)
```

J.K. Quermann
1431 Plowman Ave.
Dallas, TX 75203

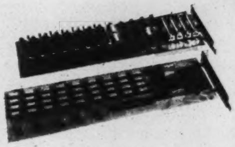
First, the IBM Personal Computer,
The Next Step . . .
Tecmar

The TECMAR Expansion series is the first and only, complete line of expansion options available for the IBM Personal Computer.

Now totaling over twenty-five separate options, the TECMAR series gives you the broadest range of expansion available for your IBM Personal Computer.

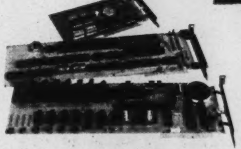


SYSTEM EXPANSION with a complete Expansion Chassis providing six additional system slots, a separate power supply and styling that complements the IBM system.



MEMORY EXPANSION in 64K 128K, 192K and 256K Byte increments of Dynamic RAM with parity. 32K Bytes of Static RAM, 32K Bytes of CMOS RAM with battery backup, or up to 128K Bytes of Read Only Memory.

PRACTICAL EXPANSION with two Serial ports and one Parallel port on a single board, or a Time of Day calendar with battery backup, a Voice Synthesizer with vocabulary in ROM and phoneme speech generation, even a BSR X10™ device controller for lights and appliances.

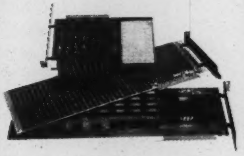


DISK EXPANSION through the addition of a five or ten megabyte Winchester disk. The disk options come enclosed in the TECMAR Expansion Chassis, providing additional expansion slots as well as Winchester disk storage. This approach assures you of unmatched system expandability for nearly any application.

FUNCTIONAL EXPANSION is also available with TECMAR Speed Disk™ and print Spooling Software that give new functionality to memory options.

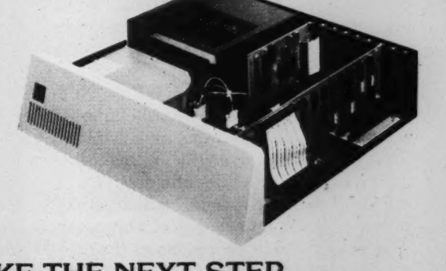
UNMATCHED EXPANSION for the serious IBM Personal Computer user through these and the many other TECMAR Expansion products available through participating COMPUTERLAND stores, and other fine computer retailers nationwide.

LABORATORY/INDUSTRIAL EXPANSION through an IEEE 488 interface, the Lab Tender with an 8 bit A/D and D/A, or the Lab Master for 12 bit A/D and D/A, a two axis Stepper Motor Controller, or the Parallel Digital-In/Digital-Out Base Board™, Video Digitization with Video VanGogh™.



DEVELOPMENT EXPANSION using an E+EEPROM programmer, Protozoa prototyping boards or a TECMAR Extender card.

NEW PRODUCTS are currently under development with many soon to be announced. At present shipping 26 unique IBM add-on products, we are still looking for needs to meet. If you have an need for a new product for the IBM Personal Computer, and would like to ask us about it, give a call on our Product Input Hotline at (216) 464-8317.



For IBM Personal Computer Expansion, TAKE THE NEXT STEP . . .

Tecmar Inc.

PERSONAL COMPUTER PRODUCTS DIVISION
23600 Mercantile Road, Cleveland, Ohio 44122
Telephone: (216) 464-7410 Telex: 241735

CIRCLE 287 ON READER SERVICE CARD

More Than Drill and Practice

Annie Fox

creative computing

SOFTWARE PROFILE

Name: Elementary Mathematics Classroom Learning System Set 1-Whole Numbers
Type: CAI
System: 48K Apple, 3.3 DOS
Format: Disk
Language: Applesoft Basic
Summary: great
Price: $495
Manufacturer:
Sterling Swift
1600 Fortview Rd.
Austin, TX 78704

Boy, am I excited! After looking at "educational" software since 1977 I have finally seen a program for microcomputers which is really worth something. I'm referring to Sterling Swift's *Elementary Mathematics Classroom Learning System.* I was ecstatic to find that somebody is creating quality educational software. Although this review pertains to the English Language Version of Set 1 - Elementary Mathematics (Whole Numbers), Sterling Swift also publishes another set dealing with fractions and decimals. Both sets are also available in Spanish.

To begin with the documentation is an outstanding "user manual" which presupposes no prior knowledge of computers. The binder which accompanies the set of six diskettes contains everything a teacher needs to know about using the package. Specific hardware requirements are prominently displayed on page one of the manual (unlike some software products which print system requirements only on the diskette label).

The manual is nicely printed (typeset) and extremely well organized. Clearly defined objectives as well as the step-by-step sequence of events for each lesson are provided. One particularly welcomed addition is the abundance of screen display illustrations.

> ***Help comes in the form of a little droid-like character who skitters across the screen and gives the student just the right piece of information at the appropriate time.***

The package contains a management diskette which enables the teacher(s) to enter the names of a maximum of 200 students who can be grouped in five different sections (the children would most probably be grouped by age, grade or achievement level). After each student's name and group name have been entered on the management disk, the simplest of instructions ("Now place the Addition disk in Drive #1 and press RETURN") tells the teacher how to create a file for each student on each of the math disks.

Once all of the students have been entered (new students can easily be added and old ones deleted) the student is ostensibly on his own.

The student chooses a math operation (strand) on which to work, by selecting the Addition, Subtraction, Multiplication or Division diskette and placing it in drive #1. (I personally feel that students should be competent in operating computers and responsible for loading disks. However, since the disks from this package are not copyable and replacement disks are sold for $9.95 each after the 90 day warranty period expires, some schools might wish to prevent potential disasters by not allowing the students to handle the disks at all).

Once the disk has been loaded, the student is asked to log in with his name, group name and secret password of his own creation. This procedure insures the authenticity of the student's work and the confidentiality of his records.

The student takes a diagnostic test which enables the program to place him at the appropriate achievement level when he first enters the system. The first portion of the test is timed; the second is not. In neither case does the student receive any feedback for individual responses during the testing session.

When the competency test is over, the student is informed of the number of correct responses he gave. The computer then indicates at which of the six lessons within the strand the student is to com-

---

Annie Fox, 35 Aries Lane, Novato, CA 94947.

THE LEADING EDGE IN PRINTERS

ONE GREAT LINE. ONE GREAT WARRANTY.

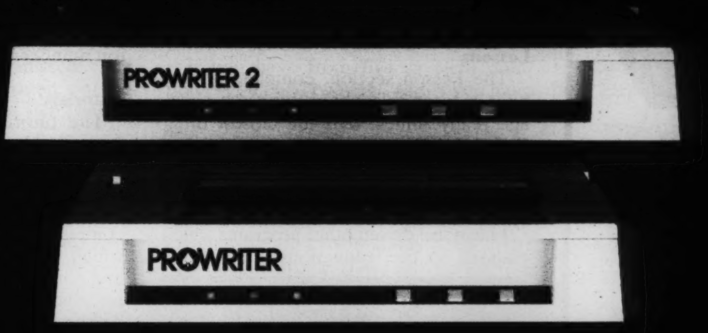
Finally, there's one full family of printers that covers every business or word processing application—all from C. Itoh, a company known for packing more product into less price; and all distributed exclusively by Leading Edge, a company known for searching out and providing that very thing. Which means that one call to one source can get you any printer, any time you need it, for any purpose. All backed by a full years' warranty from Leading Edge. (Try *that* on any other line of printers.)

THE PRO'S.

The Prowriters: business printers—and more. The "more" is a dot-matrix process with more dots. It gives you denser, correspondence quality copy (as opposed to business quality copy, which looks like a bad job of spray-painting).

Prowriter: 120 cps. 80 columns dot matrix compressable to 136. 10" carriage. Parallel or serial interface.

Prowriter 2: Same as Prowriter, except 15" carriage allows full 136 columns in normal print mode. Parallel or serial interface.



THE STAR.

The Starwriter F-10. In short (or more precisely, in a sleek 6" high, 30-pound unit), it gives you more of just about everything—except bulk and noise—than any other printer in its price range. It's a 40 cps letter-quality daisy-wheel with a bunch of built-in functions to simplify and speed up word processing. It plugs into almost any micro on the market, serial or parallel.

STARWRITER F-10

THE MASTER.

The Printmaster F-10. Does all the same good stuff as the Starwriter except, at 55 cps, the Master does it faster.

PRINTMASTER F-10

Distributed Exclusively by Leading Edge Products, Inc., 225 Turnpike Street, Canton, Massachusetts 02021.
Call: toll-free 1-800-343-6833; or in Massachusetts call collect (617) 828-8150. Telex 951-624.

CIRCLE 190 ON READER SERVICE CARD

AIRSIM™-1 Flight Simulator

Close to the ultimate in airplane simulation for the Apple*II computer.

FLICKER-FREE 3-D SCENERY. BOSTON TO NEW YORK CITY.

SIX LANDING FIELDS — HOME, 2 TRAINING FIELDS, BOSTON, MARTHA'S VINEYARD, AND NEW YORK.

ACCUMULATE SCORES FOR SUCCESSFUL LANDINGS AT HOME OR TRAINING FIELDS.

REALISTIC DYNAMIC MODELING OF AIRCRAFT.

AEROBATIC — LOOPS, STALLS, ROLLS, INVERTED FLIGHT, IMMELMANN TURN, AND MORE.

INSTRUMENT FLYING EQUIPMENT — ARTIFICIAL HORIZON, VOR'S AT 4 FIELDS, GLIDE-SLOPE INDICATOR, HORIZONTAL-SITUATION INDICATOR (HSI), RADAR, BALL-BANK INDICATOR.

OPTIONAL INSTRUMENT FLYING MODE — CLOUD CEILING 500 FEET.

WRITTEN IN MACHINE LANGUAGE.

FOR APPLE II OR II+ WITH 48K RAM, 1 DISK, APPLESOFT ROM OR EQUIVALENT.

master charge

$40.00 for diskette and manual.

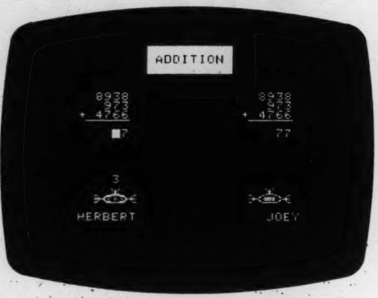
VISA*

Mass. residents add 5% ($2.00) sales tax. Overseas shipping add $3.00.

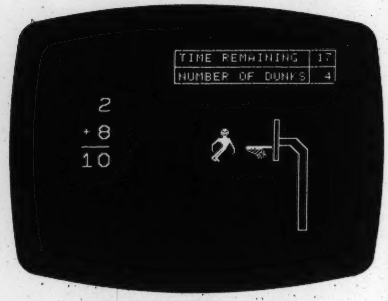
MIND SYSTEMS CORPORATION
P.O. Box 506
Northampton, MA 01061
(413) 586-6463

*Apple is a trademark of Apple Computer, Inc.
Airsim is a trademark of Mind Systems Corporation

More Than Drill, continued...



Space War.



Slam Dunk.

mence his work the next time he signs on to the system, which could be immediately or in two weeks time.

Lessons

The Lesson section, complete with a built-in tutorial is where this math package really shines. It is the closest thing I've ever seen to having a good teacher standing right there beside the student, leading him through a math problem step by step.

I have test driven other programs which claimed to be "educational" and some which even had the audacity to call themselves "instructional," but for the most part they were only effective in the area of drill and practice. This *Elementary Mathematics Classroom Learning System* actually does some teaching. Here the student who is having difficulty with the concept behind the math problem can receive some valuable help from the computer.

The most salient feature of this package is its consistent quality.

The help comes in the form of a little droid-like character who skitters across the screen and gives the student just the right piece of information at the appropriate time. For example, if the student is faced with a subtraction problem such as:

$$\begin{array}{r} 96 \\ \underline{-\ 9} \end{array}$$

and he places an incorrect digit in the ones column, the computer will draw out the 96 so that it is re-written as nine tens and six ones. Then the little droid will walk across the top of the screen, and "borrow" one of the tens (changing the 9 to an 8) and "carry" it over to the six in the form of a little 1, placing it directly beside the six so it becomes sixteen. He will then point to a message which simply states "I traded a ten for 10 ones in the top number."

Tutorials

The tutorial sections of each of the four strands are equally well presented. For example, if the student is having trouble with 4 x 5, our droid friend obliges by transforming it to an addition problem complete with four groups of five squares which the student can physically touch and count if he likes. It would have been an absolute pleasure for a non-math person like myself to have learned it like this back in elementary school. Who knows what mathematical heights I might have reached?

After the lesson has been completed, the student is given a report of his score and the option of repeating the drill cycle. If he chooses to end the lesson, a timed mastery check cycle begins. Each lesson objective has a "mastery criterion" ratio (correct responses/total problems) which must be achieved before he can advance to the next lesson. As always, the student is given a report of his performance and advised as to which lesson he will be working next time.

Although the graphics in this package are not in color (which seems a shame since it was written for the Apple), they are excellent and the animation is really delightful. I happily noted the use of upper- and lowercase text as well as inverse video for a varied display.

Also, for the sake of variety, the entire screen is used and you never know where the droid and the next problem will pop up next. Likewise, the acknowledgements and the accompanying animation which the student receives for correct responses are varied and randomized which adds a nice element of anticipation.

Games

Provided along with the Management disk and the four mathematics disks is a Games disk which contains two games, Slam Dunk and Space War. These games deserve special mention because as math games go they are really quite good. They are designed to provide further opportunity for mastery of math skills.

Slam Dunk is a basketball-type one-person competition in which the player's ability to answer math problems (of the operation of his choice) determines the outcome of the shot to the basket. Get the answer right and the ball sails through, miss and it bounces off the backboard.

Each game lasts for a 30 second period (which is an excellent feature in a classroom situation where without a time limit a student might not have the self-control to give his classmates a turn). Incorrect response causes the clock to stop and the correct answer to be displayed on the screen.

When the clock starts again, the next problem the student must solve is the same as the one he just missed. The student's performance is rated on the number of correct responses given within the game period.

The second game is called Space War, and is not nearly as trite as the title sounds. In this game, two players race to solve identical addition and subtraction problems by dialing and entering the correct digits with the Apple game paddles. Incorrect digits are not accepted.

The first player to solve the problem correctly gets one point and the opportunity to deliver a phaser blast to his opponent's ship. Three points wins the game. It's a good test of math skills in addition to being great fun.

Although Slam Dunk can be used by any student who first signs on to the system, because the problems in Space War are more difficult, Sterling Swift recommends that it be played only by students who have demonstrated mastery of a strand.

How Many To Buy

So if you are interested in this kind of set up for your school what do you need? Well, according to the table included in the documentation, if you have between one and four computers (and we'll assume you already have them), you can get by with one set of diskettes.

If you have from five to eight computers you need two sets. And if you have nine to twelve computers you need three sets.

The first set costs $495 and each additional set (of the same version and "purchased and billed to the same account") is $295. This package is not inexpensive. School budgets being what they are, it probably would represent a sizable investment for an individual school or district. To lessen the risk of purchasing the product and finding it isn't what you want, a demonstration disk of the package can be purchased for $6 which will be applied towards the purchase price of the package if you decide to buy it. But because of the comprehensive nature of the package it certainly seems that the students could greatly benefit by the inclusion of this kind of computer assisted instruction in a traditional math curriculum. The most salient feature of this package is its consistent quality—quality which could only have been achieved by fine educators who knew what they wanted, working in conjunction with gifted programmers who knew how to create it. □

HAPPY HALLOWEEN FROM MR CHIPPS COMPUTER CO.
SANDY

"This hex program you sold me is a GYP! I can't hex a bleeping person with it."

"Simply the best word processor...anywhere"

For the Apple™

No hardware additions needed — What you see is what you get. All functions are displayed on the screen exactly as they appear in print including:

- Underlining
- Bold
- Superscript
- Even/normal justification
- Lower and upper case
- Block movement
- Global replace
- Plus many more features

"Word Handler is simply the best word processing software I could find anywhere by far."
William R. Moroney
President
Electronic Funds
Transfer Association

Now Available!
List Handler
A mailing list program to work with the Word Handler (interfaces with VisiCalc™ and DB Master™) stores up to 3000 records per disk, unlimited sorting fields.

Word Handler

Once you buy a Word Handler we don't forget you; our customer service department is available daily. We support our products.

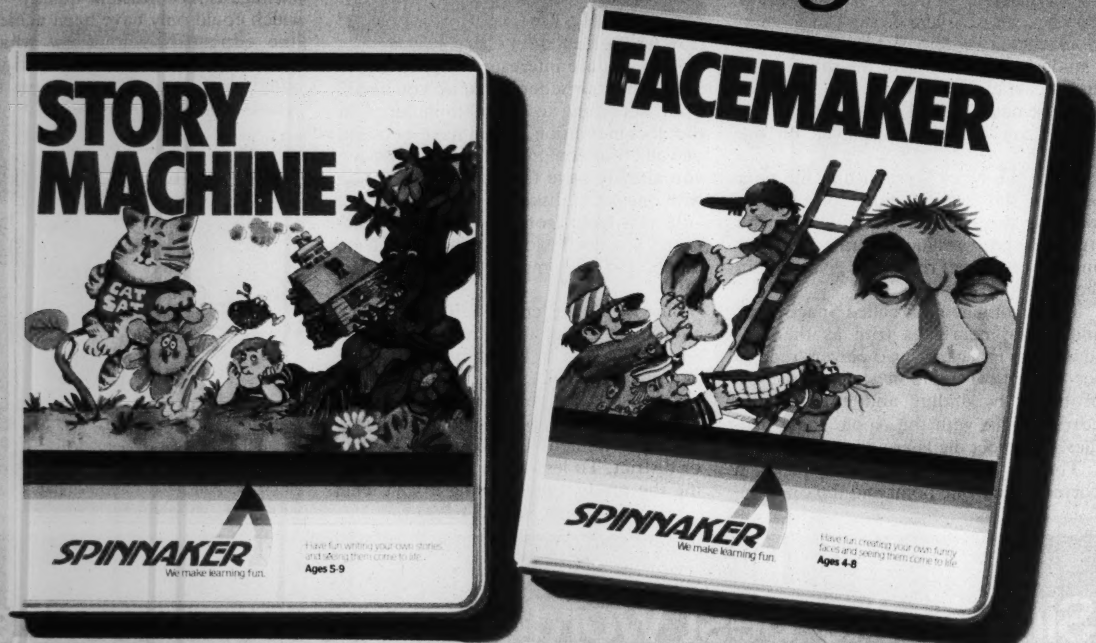
When upgrades are introduced you are supplied with a replacement disk FREE! Contact your local Apple™ dealer for a demonstration. You'll be glad you did.

Silicon Valley Systems, Inc. 1625 El Camino Real #4 Belmont, CA 94002 (415) 593-4344

Silicon Valley Systems

CIRCLE 262 ON READER SERVICE CARD

Introducing Spinnaker. We make learning fun.


STORY MACHINE
CAT SAT
SPINNAKER
We make learning fun.
Have fun writing your own stories and seeing them come to life.
Ages 5-9
FACEMAKER
SPINNAKER
We make learning fun.
Have fun creating your own funny faces and seeing them come to life.
Ages 4-8
SNOOPER TROOPS I
Case #1 The Granite Point Ghost by Tom Snyder
SPINNAKER
We make learning fun.
Someone is haunting the old Cable Mansion. It's up to you to find out who. But don't get caught!
Ages 10-Adult
SNOOPER TROOPS II
Case #2 The Disappearing Dolphin by Tom Snyder
TOBASCO AQUARIUM
SPINNAKER
We make learning fun.
Lily the dolphin is missing. It's up to you to find out who did it. And why.
Ages 10-Adult

© Spinnaker Software Corp., Cambridge, MA 1982

At Spinnaker Software, we make educational games that are actually fun.

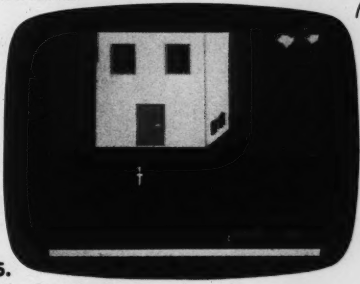
Because they're fun, your children will use them. Instead of letting them collect dust in the basement.

And because your children use them, they'll be learning. And after all, isn't that what educational games are all about?

Our games are educational, because you can't kid parents.

As a parent, you're probably very concerned with how much time your kids spend playing mindless video games.

Sure, they're fun. But they don't do much more than develop reflexes and hand-eye coordination. Spinnaker games are different.



All our games have true educational value. They help develop a child's learning skills. And that's something your kids can take with them wherever they go.

Our games are fun, because you can't kid kids.

Kids like Spinnaker games for the same reasons they like roller coasters, going to the beach and ice cream sundaes.

They're fun. Lots of fun. So much fun your kids will probably forget they're learning.

Our games make the computer screen come to life. With colorful graphics, animation and sound.

And they're easy to use. In fact, a lot of our games are easy enough for kids who've never even used a computer before.

How do we make our games both educational and fun?

We're glad you asked.

Educators and game programmers write our software.

Educators, because they've been in the classroom and know how children learn. And what it takes to keep their interest.

Game programmers, because they know how to have fun with computers. These programmers give our games the high resolution graphics, animation and sound that make them so entertaining.

And right now, we're introducing four new games that can be played on the most popular computers, Apple,® Atari,® and IBM.®

First, there's FACEMAKER. It's for young computer users, kids ages 4-8. FACEMAKER helps children improve memory and concentration and provides familiarity with the computer.

Another game for young users is STORY MACHINE. This game lets children ages 5-9 write their own stories and see them acted out on the screen. STORY MACHINE helps children learn to write correctly and acquaints them with the keyboard.

Our SNOOPER TROOPS™ detective series gives your child mysteries to solve. As a Snooper Trooper, your child will have to do some daring detective work, including crawling through dark houses and talking to mysterious agents.

Designed for kids ages 10 and older, SNOOPER TROOPS helps children learn to take notes, draw maps, classify information, and develops vocabulary and reasoning skills.

All four games are available in stores today.

With Spinnaker products, you can rest easy knowing your children are spending their time wisely.

So ask your retailer about the growing line of Spinnaker games.

Because one of the smartest things parents can do is help their children learn.

SPINNAKER™

We make learning fun.

CIRCLE 273 ON READER SERVICE CARD

Apple, IBM and Atari are registered trademarks of Apple Computer, Inc., International Business Machines Corp. and Atari, Inc. respectively.

Math For Older Students

James S. Coan

creative computing
SOFTWARE PROFILE
Name: Factoring Whole Numbers
System: TRS-80 16K, 6 tapes
TRS-80 Model I 32K, 3 diskettes,
TRS-80 Model III 32K, 3 diskettes,
Apple 3.2 32K, 3 diskettes,
Apple 3.3 Vers. 2.0 48K, 3 diskettes
Pet 16K, 6 tapes
Pet 16K, 3 diskettes
Summary: Twelve interactive lessons, games, and exercises
Price: $90
Manufacturer:
Quality Educational Designs
P.O. Box 12486
Portland, OR 97212
(503) 287-8137

The promotional material for *Factoring Whole Numbers* states: "These are highly interactive programs that your students will enjoy. Each lasts about 20-30 minutes depending on student responses. Pacing to suit the individual 'talking' to the computer is built into the programs so that the student succeeds as learning occurs. The Series is appropriate as new material for students in the upper elementary and junior high schools, and for review or remedial work at the secondary or junior college level."

I have the Apple Version 2.0 programs for 16-sector 3.3 DOS. This comes on three diskettes, each of which contains four well designed factoring exercises.

Documentation

The software comes in a nice three ring notebook. The diskettes are in plastic jackets at the back. You get a title page, a single CPU software license, and five pages devoted to the teaching material itself. Non-profit educational institutions may purchase permission to make copies for additional CPUs. None of this material is required for the student. It is intended for the teacher.

However, there is no discussion of how to get the teaching material running on the computer, nor is there any mention of how to terminate a session.

Figure 1.

Diskette One
  Introduction
    1A Factor Pairs
      1B The Rectangle Game
    2A Pairs and Squares
      2B Guess and Test

Diskette Two
  Introduction
    3A Primes and Composites
      3B The Sieve of Eratosthenes
    4A Exponents
      4B How Many Factors

Diskette Three
  Introduction
    5A Highest Common Factor
      5B The Euclid Game
    6A Least Common Multiples
      6B Factoring Finale

The Programs

The user soon learns that the display screen is set up for upper and lower case letters using the Apple hi-res graphics screen. The menu offers to run any of the programs on the current disk, and makes instructions optional. Each program has a nice leading hi-res display screen. Responses are ended by pressing Return. For word responses it is sufficient to enter the first letter only.

Figure 1 shows the contents of the three disks. Each A program introduces the topic and provides some practice. Each B program is designed to extend the concept and encourage the student to explore further. Most of the B programs finish up with a game or contest involving two or more students.

To quote the author: "Some of the B programs go beyond the standard junior high curriculum. These are designed to preview, in an informal fashion, ideas which will be important in later mathematical work." The material seems to do this very well.

Each lesson/exercise/game is designed to accommodate a wide range of skill levels within the topic being presented. Many of the instructions are optional. The display speed is user-controlled. Some of the games may involve up to six students.

The package is definitely user-friendly. All responses which one might expect are well fielded by the programs. Wrong answers are handled very well.

The analysis of responses is quite complete. It notices illegal decimal numbers,

---

James S. Coan, RD #1, Box 149, New Hope, PA 18938.

corona announces new products and prices

Starfire — the Winchester disk for Apple II

5MB	$2495
10MB	$2995

(includes CP/M and Pascal extensions)

The Personal Hard Disk — the Winchester disk for the IBM Personal Computer (fits inside the IBM PC)

5 MB	$1995
10 MB	$2495

---

corona
data systems, inc.

The Third Generation Microcomputer Company

31324 Via Colinas, Suite 110
Westlake Village, CA 91361
213-706-1505

CIRCLE 147 ON READER SERVICE CARD

numbers too high, numbers too low, and illegal negative numbers, and requests, "Number please" when all else fails. It even handles responses such as 1.4E1 when the correct response is 14. This is well done.

There is never a sarcastic word in this package. Right answers are treated with enthusiasm, while wrong answers are handled in a supportive way. The whole idea is to promote successful progress through the programs.

Often a program will offer to explain a concept. This provides the first time user a chance to get the maximum instruction, and allows the repeater to pass over unwanted detail.

Some of the programs ask questions designed to assess just how appropriate this lesson is for the student at the time. If the user's responses are reasonable, the lesson proceeds. If his responses are clearly out of line, the program suggests another lesson to be studied and returns to the menu.

All questions recognize Q as a request to select another program. Ctrl-C or Reset at any time also returns the user to the menu.

Each diskette may be run independently by either turning the Apple on with it in the disk drive or by typing in #S (slot). One can easily move from one diskette to the next by placing the next one in the disk drive and issuing the Q request. There is no direct method offered for ending a session. The user is expected to turn the Apple off.

The optional instructions are well paced. The screen is presented a few lines at a time. Each screen is frozen in place with "Press return to continue" displayed on the bottom line.

I have selected a few sections to review here in detail.

Diskette One

Introduction: The introduction explains how to use the computer. The student is offered the option of all upper case or upper/lower case display. He can even control the time delay between sentences displayed on the screen. (It is assumed that the user has been able to put the disk in the drive and turn the machine on.)

1A Factor Pairs: Factoring a whole number into a factor pair is presented as finding the possible lengths and widths of a rectangle with a given area. It is recommended that you obtain 100 square floor tiles. Clearly you should get the little 1 inch by 1 inch ceramic ones. Alternatively you could cut cardboard squares. The student uses these squares to form rectangles and come up with areas and, later on, perimeters.

Diskette Two

3B The Sieve of Eratosthenes: This is an excellent treatment of the topic. The sieve is beautifully illustrated on the screen by actually crossing out all multiples of the most recently discovered prime. The student is asked for the first number to cross out and the computer does the rest. It is fun to watch.

In addition we learn when Eratosthenes lived and a little about Euclid as well. We learn about Twin Primes, Palindrome Primes, and even Goldbach's conjecture. (All even numbers can be written as the sum of two primes, one (1) may be used for this.) All in all, a math teacher's dream.

4A Exponents: This one very nicely teaches why exponents are useful by demonstration. If you properly factor 128, the program next asks if you want to try 16384. If you say "yes," the author is definitely up to the challenge. On the other hand, if the student repeatedly fails to get right answers, the program apologizes and returns to the menu. Clearly not threatening or intimidating at any level.

There is something in these programs for a wide range of students. Any teacher who has a computer which will support these programs and who teaches Factoring Whole Numbers will want to use them. ☐

RanaSystems

Your Apple computer can grow from ordinary to awesome in a matter of minutes.

The Elite disk drive Series by Rana Systems *gives* you that kind of magic. Quickly, easily and cost-effectively.

This superb family of sophisticated floppy drives was designed and perfected by a team of industry-respected engineers expressly for Apple® computer owners who have long been demanding more disk drive for their money.

Now they *have* a drive that makes an Apple perform the way it should. For example;

Elite One, the most economical Rana drive, delivers 15% more storage capacity than Apple's drive. The top-of-the-line Elite Three will provide an astonishing *four-times* more storage, approaching hard disk performance. It's done through exclusive high-density single and double-sided disks and heads.

APPLEWRITER* EXTENDED
additional capabilities

80 COLUMN VIDEO CARDS

LOWER CASE ADAPTERS

CP/M
Fortran
Pascal

Voice Entry

free catalog

Microsoft Z-80 Softcard
Microsoft 16K Ramcard
Videx Videoterm

APPLE SOFTWARE
APPLE ACCESSORIES
CALL TOLL FREE
For specific software not listed, CALL 1-800-368-2260

Gold Disk™

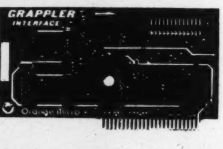
Tel. 1-800-368-2260
VISA/MC/Check/M.O.
Free BASF disk

Attach SYSTEM SAVER to your Apple II

FREE DATA DISK WITH EVERY $49 WORTH OF PURCHASE!

INTERFACE CARDS

The Grappler
Apple Graphics Interface



The most intelligent Apple Interface available. EPROM chip makes high-resolution graphics easy. Versions to accommodate the Anadex, Epson Series*, IDS Paper Tigers, Centronics 739, NEC 8023, C. Itoh Prowriter, Okidata Series* and more.

*Requires Graphics Upgrade.

The MICROMODEM II is a complete communication system for the Apple II. It can transmit over the telephone lines data between your Apple and other computers anywhere in North America. In addition the Apple can be used as a remote terminal to another computer. The possibilities are endless.

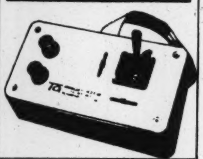
HAYES MODEMS

MICROMODEM II

Corvus SOFTWARE

Type-and-Talk
Video Digitizers
Bar Code Readers
Card Readers
Game Controls
Graphics Tablet
Music System
Numeric Keypads
Programming Aid

TG Products
JOYSTICK



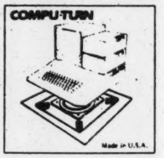
The EXECUTIVE SECRETARY

All the usual word processor functions
40 or 80 columns - selectable
Real shift key without soldering
Full format control
Full forms handling
Keyboard input at print time
Supports any printer
Built-in Card File w/Report Generator
Access to external databases, such as Data Factory and others
Built-in Electronic Mail

Introducing COMPU-TURN a turn-table platform that enables you to rotate your personal computer, disk-drives, and monitor to any position you desire. By simply placing COMPU-TURN under your computer it puts the keyboard at your fingertips and directs the monitor for easy viewing. COMPU-TURN helps you get the most out of your personal computer by reducing eyestrain or clumsy reaching due to an ill positioned unit. Let your system follow you wherever you go, with COMPU-TURN.

And when the work is over COMPU-TURN also creates easier game playing situations for the family when using game controllers or paddles.

COMPU-TURN

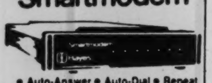


Made in U.S.A.

FEATURES:
- 1/4" solid black plexiglass
- Heavy duty ball-bearing mechanism
- Highest quality construction
- 12" x 14" top platter (accepts Apple, 2 disk-drives & monitor)
- 9" x 9" bottom platter for stable installation
- Non-skid, non-scratch soft rubber foot pads
- No assembly required.

ONLY $39.95
Suggested retail price

Smartmodem



- Auto-Answer • Auto-Dial • Repeat
- Programmable - Use Any Language
- Touch-Tone and Pulse Dialing
- Audio Monitor - Listen to Connection
- FCC-Approved Direct-Connect
- Full or Half Duplex, 0-300 Baud
- RS-232C Interface • 7 Status LED's
- Two Year Limited Warranty

The PKASO Interface
Gray scale printing
Snapshot screen dump
support for the Apple Z-80 CP/M
Apple /// compatibility

The master PKASO **printer interface at a very low cost**

GOLD DISK™ Software
Box 102
Glen Arm, Md. 21057
TOLL FREE 1-800-368-2260

MasterCard

VISA

No Credit Card Penalty

END OF SUMMER
SPECIAL DISCOUNT
FOR ALL STUDENTS
AND PARENTS OF STUDENTS!

1-800-368-2260 (In Maryland, Call 592-5949)

*APPLE IS A TRADEMARK OF APPLE COMPUTER INC.

CIRCLE 173 ON READER SERVICE CARD

tices...notices...notic

Correction

Due to a printing error, Line 653 of "Zeno's Space Ships" (August 1982, page 170) is incorrect. The line should read: 653 PRINT "."

New Journal Calls for Papers

A new quarterly, *The Journal of Computers Reading & Language Arts* (CRLA) is ready to receive papers. The purpose of the journal is to support the rapidly growing interest in computers and their relationship to reading, language arts and related issues.

The journal will be pragmatic in perspective, and will emphasize papers which have clear classroom/teaching implications.

The journal will be interdisciplinary and directed toward an audience of reading-language arts teachers, educational specialists, classroom teachers, educators of teachers and educational researchers.

Papers or requests for information should be sent to Gerald H. Block, CRLA, P.O. Box 13039, Oakland, CA 94661.

Graduate Fellowship

The Charles Babbage Institute for the History of Information Processing is accepting applications for a Graduate Fellowship to be awarded for the 1983-1984 academic year to a graduate student whose dissertation will be on some aspect of the history of computers and information processing.

Residence can be at the home academic institute, other research facility where there are archival materials, the Babbage Institute, or some combination of these. There are no restrictions on the location of the academic institution which will be the venue for the Fellowship. The stipend will be $5000 plus an amount up to $2500 for tuition, fees, travel, and other research expenses.

For more information, contact the Charles Babbage Institute, University of Minnesota, 104 Walter Library, 117 Pleasant St. S.E., Minneapolis, MN 55455, U.S.A. by January 15, 1983.

More tips from the authors of Beneath Apple DOS . . .

Bag of Tricks™

By Don Worth and Pieter Lechner

Now there is more from the authors of the best selling book ***Beneath Apple DOS***—four comprehensive utility programs on diskette and **over 100 more pages** of valuable information about the Apple II's disk operating system.

BAG OF TRICKS is useful to beginners and experienced programmers alike. It includes many "hand holding" tutorials that assist you in repairing damaged diskettes and allow you to change sector ordering, reconstruct blown catalogs, etc. etc. etc. At the low price of $39.95, BAG OF TRICKS is one of the best software values ever.

The four programs and their functions are:

1. TRAX dumps and examines a raw track, either 13-sector or 16-sector, displays the internal Apple diskette formatting information, and flags exceptions to standard formats.
2. INIT will reformat one or more tracks, attempting to preserve the contents of undamaged sectors. It also allows you to change sector order. This can cut disk access times by 40% or more!
3. ZAP is a sector editor like no other! More than 50 commands are available to assist you to locate, compare, change, or print the data on your diskettes. ZAP is even programmable! Using powerful macros, it is possible to transfer and compare DOS, CP/M, or PASCAL files.
4. FIXCAT automates the process of repairing a damaged diskette catalog. It operates with or without user intervention, locating "lost" files and rebuilding the catalog—from scratch if necessary! DOS removal and VTOC repair are also possible.

Requires Apple II or Apple II Plus with 48K RAM and one disk drive **$39.95**

QS QUALITY SOFTWARE

6660 Reseda Blvd., Suite 105, Reseda, CA 91335

CIRCLE 249 ON READER SERVICE CARD

Quiz Time in The Classroom

Annie Fox

Spelling Bee from Edu-Ware is a well organized spelling package for kindergarten through third grade students. It was thoughtfully designed by people who seem aware of the problems inherent in a computerized spelling tutorial for classroom use.

I was particularly impressed with both the ease with which the teacher can become involved without any prior computer experience and the flexibility of the program in the area of setting parameters tailored to the individual student.

Spelling Bee consists of several different "modes" plus eleven units of spelling words (each accompanied by a line drawing). Three of these spelling unit categories are: "Simple 2 and 3 letter words," "Hard c's and silent e's," and "One syllable with Dipthongs" (which is really spelled "Diphthongs" and which just goes to show that even people who write spelling programs never outgrow the need for good spelling skills). In the Demonstration Mode the teacher may choose one of the spelling units and preview it.

The Learning Management Mode permits the teacher to enter the student's name, the spelling unit(s) on which he is to be tested, and the number of words to be chosen from each unit. This last feature is a very nice option in that it allows the teacher to take the child's attention span into consideration when setting up a test situation.

The Tutorial Mode gives the student an opportunity to practice spelling each of the words in the unit (after having seen them flashed briefly one at a time) without having his errors accepted by the computer or displayed on the screen.

Drill Mode

The Drill Mode is the electronic equivalent to the old Friday morning "Class, are you ready for this week's spelling test?" With the parameters previously set in the Learning Management Mode the teacher has designed a test for a student based on his individual needs.

creative computing

SOFTWARE PROFILE

Name: Spelling Bee

Type: CAI

System: 48K Apple II, DOS 3.3

Format: Disk

Language: Applesoft Basic

Summary: Cute

Price: $39.95

Manufacturer:

Edu-ware
28035 Dorothy Dr. #200
P.O. Box 2222
Agoura, CA 91301

If Jennifer needs practice with her diphthongs (which are, by the way, complex vowel sounds made by gliding continuously from the position for one vowel to that of another all within the same syllable, e.g., chain, boat, toy), that's just what she will get.

After the Drill Mode is completed the student's score is recorded and reviewed at the teacher's convenience. Since the computer keeps track of precisely which words were and were not spelled correctly the teacher is in a good position to pinpoint potential spelling problems and provide remediation.

Positive reinforcement is certainly a necessary element of the learning process. In this program, the reinforcer for a correctly spelled word takes the form of a point placed underneath a smiling face and a few bars from a familiar children's song. Although this is a nice touch, the graphics could have been a bit more spectacular.

As was mentioned before, in addition to the spelling words which are provided for the student, *Spelling Bee* also displays a drawing paired with each word. The pictures were included in adherence to the sound premise that learning takes place as the learner makes the transition through concrete concept (picture) to abstract, symbolic representation, (written word). Let's talk about these drawings for a moment.

I am one educator who heartily approves of the introduction of fun into learning, and trying to identify computer drawn pictures is fun. Some of the pictures, however, are difficult to decipher.

If the word to be spelled is determined by the student's ability to identify the corresponding picture, there could be problems. For example, the "oval" in the program could easily have been a drawing of an egg. (Which is what several of my young friends guessed it to be.) Likewise, one morbid individual thought the "swing" was a scaffold, and another was sure it was "two chicken feet."

I mention this not to nit-pick but to point out that this kind of ambiguity

---

Annie Fox, 35 Aries Lane, Novato, CA 94947.

ALIEN
ambush™
ALONE IN AN UNCHARTED GALAXY, YOU'RE SUDDENLY AMBUSHED BY AN ALIEN MARAUDER. INSTINCTIVELY, YOU FIRE YOUR LASERS. HITTING THE ATTACKER, YOU WATCH IN HORROR AS IT SPLITS INTO TWO MENACING CRAFT. YOU GROW DESPERATE AS MORE ALIENS CAREEN TOWARDS YOU...
WHAM

by Peter Fokos

You haven't lived until you've died in space.

SCORE HI-SCORE SHIPS
03360 03380

And here's your chance.

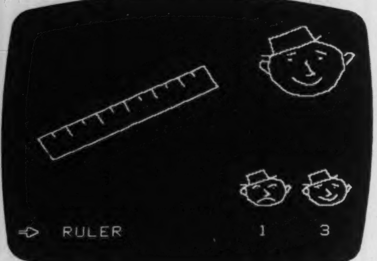
Software author Peter Fokos has created Alien Ambush, a space age nightmare. This hi-res, full-color arcade game is written completely in assembly language to give those nasty aliens every advantage.

So if you have access to a 48K Apple* with DOS 3.3, and you're hot for some new thrills, Alien Ambush was written for you. But be warned: It just got a lot tougher to survive in space.

Available at finer computer stores everywhere. *Apple is a trademark of Apple Computer, Inc.
Distributed exclusively by Micro D, 17406 Mt. Cliffwood Circle, Fountain Valley, CA 92708 (714) 540-4781
CIRCLE 206 ON READER SERVICE CARD

provides built-in frustration for the young child. After all, how can he spell a word correctly, if he doesn't know what word he is supposed to be spelling?

Two of the spelling units in the Demonstration Mode Menu were labeled "Multisyllable words." I guess strictly speaking, "multi" means more than one, but of all the "Multisyllable" offerings only one (butterfly) had *more* than two syllables, and one of the words (stairs) had only one. (I'm sorry, but no amount of facial contortions allows me to get more than one syllable out of that word without sounding like a throwback from the Beverly Hillbillies.)



Spelling Bee.

Also, for some reason "magnet" and "pliers" are found in the unit called "Simple multisyllable words," while "apple" and "table" are considered "Complex multisyllable words." These are minor points and in no way devalue the program as a whole.

Documentation

Although the documentation for *Spelling Bee* was complete, it was contradictory in places and rather confusing in the sections describing how to enter the Learning Management Mode. I talked to the people at Edu-Ware and was advised that all of their documentation "is being rewritten to be easier to understand for the customer."

Spelling Bee is not a perfect product. If there were some way for the teacher to add words and pictures to the existing spelling lists in the program it would be improved markedly. It is, however, definitely a good spelling package for the money and any school which is lucky enough to have a computer would do well to include this program in its educational software library.

Math Competency Series

This program also goes a long way in permitting the teacher to vary the parameters of each of the math games. Since students are people and people are individuals it makes sense to be able to alter programs to fit the individual. Specifically the Zeitgeist package allows modification of Student's Required Response Time, Problem Type and Problem Difficulty, Duration of Game and Help Messages.

To make the practice of mathematical skills more inviting, the Zeitgeist people have attempted to appeal to the game player who dwells within every student. (Certainly a good idea, and bound to be more entertaining than flash cards.) In keeping with "the spirit of the times" they chose to model their programs after the hottest computer game genre: Space Games.

Before we delve into the specifics of these games, it should be noted that the descriptions given below do not match the visual display of the actual game, by any measure. Any child reading his student guide and preparing for a Star Wars-like space adventure is in for a cosmic disappointment.

According to my dictionary *Zeitgeist* means "spirit of the age, trend of thought and feeling." Perhaps the company's founders felt that they would christen their enterprise with a name which would describe their reason for existence, which, according to the cover of their documentation involves "creating a better world in which to learn" (using computers, I assume).

The four programs in the *Zeitgeist Math Competency Series* are designed for "drill, practice and enrichment." The intended audience is elementary and junior high school students, although the programs could certainly be used successfully for high school students or adults in need of math remediation.

creative computing

SOFTWARE PROFILE

Name: Math Competency Series

Type: CAI

System: 48K Apple II, Applesoft in ROM, DOS 3.2 or 3.3

Format: Disk

Language: Applesoft Basic

Summary: An average CAI math program

Price: $174.50 for 4 diskettes
49.50 single disk price

Manufacturer:

Zeitgeist
5150 North 6th St. #179
Fresno, CA 93710

These programs do not really *teach* mathematical concepts at all, and this should be clearly understood by anyone who is contemplating using them for this purpose. A child who does not understand the concept of addition is not going to succeed in solving "12 + 12=?" despite the presence of colorful space maps.

Math concepts are learned from discovery, manipulation of materials, visual demonstrations and determined teachers who are willing to try any and all combinations of the above until concepts become clear. Computer math programs are available in that they serve the function of *reinforcing* concepts and skills which the student already possesses.

Documentation

The documentation for the series is beautifully printed, complete and well organized for easy reference. The textured paper adds a touch of class. The student guide is excellent as it provides the learner with everything he needs to know about using the program (from turning on the TV to loading the diskette and rebooting if necessary). The inclusion of this kind of clearly written student instruction is rare among educational software packages, and yet what could be wiser?

Educational computer programs are, for the most part, designed for independent student use. If students don't know how to operate computers, they miss the opportunity to work on their own and teachers become overburdened. The more self-sufficient the student at the computer can be, the easier the use of computer-based instruction in terms of classroom logistics.

Another positive aspect of the Zeitgeist package is the Help Messages which accompany each of the games. These were written for the student to assist him in solving the type of problems with which he is currently working. They are composed of step-by-step procedures for the solution of certain math problems and the student must be able to generalize the rule to apply it to the specific problem with which he is having trouble. These Help Messages would serve well the student who simply needs to be reminded of a specific "how-to" portion of solving a problem. The student who is feeling confused and utterly lost probably needs more help than the Help Messages can offer.

Invader Round Up

The first game in this series is called Invader Round Up. Here the student must collect a certain number of invaders who have had the misfortune of wandering into a guarded quadrant.

Problems involving addition and subtraction of whole numbers must be solved before invaders can be located and captured. The computer supplies problems

valFORTH™ for Atari* 400 800

Professional Software for the Hobbyist

VALPAR
INTERNATIONAL

FORTH has been used for years by ATARI* and others in programming their arcade games. FORTH is *fast*, 15-20 times faster than BASIC, and can make use of every capability for your computer. And it's no longer the province of the professional programmer! With valFORTH and the additional packages described below, you can create programs in an afternoon that would previously have taken weeks of hard work!

WHAT? YOU DON'T ALREADY KNOW FORTH?

Then take advantage of our special offer on *Starting Forth* by Leo Brodie. Widely acclaimed as the best book available on the subject, this entertaining treatment of Forth will make you comfortable with this exciting language quickly and easily. When you order *Starting Forth*, you get a free copy of our "Notes for the valFORTH User," including references, by page, to *Starting Forth*.

These are the exact utilities developed by Valpar International's professional software specialists and used to create our commercial software products.

NEW! By Popular Demand!

valDOS. Now you can use your valFORTH system to read and write normal Atari DOS Files created with valDOS or other sources. Also includes valDOS File Editor for creating and reading FORTH Source Code without "screens." (Not a general file editor.)

(Over 25 pages of documentation. Requires valFORTH.)

valFORTH T.M.

Package contains: fig-FORTH kernel with mathematical and stack operations machine-coded for higher speed than normal fig-FORTH; line editor AND screen editor, debugger, sound and graphics commands, floating point, advanced 6502 assembler, diskcopiers, and much more! (Over 110 pages of documentation)

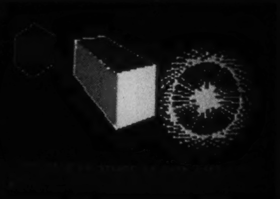
GENERAL UTILITIES AND VIDEO EDITOR

Utilities: 4 array types, 4 case types, text on graphics 8, extensive string manipulation and keyboard input, STICK & PADDLE, randoms, bit manipulation, and much, much more.

Editor: *fast, powerful, complete* valFORTH screen editor 1.1. A professional-quality tool that makes editing a pleasure.

(Over 60 pages of documentation. Requires valFORTH.)

PLAYER-MISSILE GRAPHICS, CHARACTER EDITOR, & SOUND EDITOR



Player-Missile: Create, move, color, change images of and bound players and missiles with high level commands. Full support of 5th player, multicolor players, etc. etc. All critical sections in machine code.

Character Editor: Compose character sets with joystick. Simultaneous display of created characters. Make images for players and missiles.

Sound Editor: Simple independent control of all four voices (one joystick per voice) and audio-control register. Create any single-setting sound with graphical and tabular readout.

(Over 35 pages of documentation. Requires valFORTH.)

VALPAR INTERNATIONAL
3801 E. 34TH STREET
TUCSON, ARIZONA 85713
Call Toll-Free 800-528-7070 In Arizona call (602) 790-7141

For more information *fast* and a free 4TH ♥ IF HONK THEN bumpersticker, send a self-addressed, stamped envelope.

Atari is a trademark of Atari, Inc., a division of Warner Communications.

Principal Software Authors: Stephen Maguire and Evan Rosen

Coming Attractions: Next month — TARGET COMPILER, 3D WORLD

DISPLAY FORMATTER

Fast, simple creation of all types of display lists, with automatic 4K boundary jumping. Automatic or user controlled memory allocation, and formatting for horizontal and vertical scrolling, and display list interrupts.

(Over 30 pages of documentation. Requires valFORTH.)

TURTLE & valGRAPHICS AND ADVANCED FLOATING POINT ROUTINES

Turtle Graphics as in *Atari* Pilot* and much more:

All graphics modes supported — even GTIA and "7+". Draw and fill commands *faster* and *smarter* than Basic. "Turn-toward" for "chasing" and vanishing point effects; point labeling, etc. Also SIN, COS, ATN, ATN2, etc. added to floating point.

(Over 35 pages of documentation. Requires valFORTH.)

Text Compression and Auto Text Formatting

A unique, two-part utility!

- Text Compression allows the packing of text into much less space than normally required. Useful for wordy Adventure games, "artificial intelligence," etc.!
- Auto Text Formatting takes both normal and compressed text and routes it to the video screen "windows."

(Over 20 pages of documentation. Requires valFORTH.)

valFORTH alone requires 24K
valFORTH plus one or more packages requires 32K minimum
Memory requirements include 10-12K working space.
All products are now on non-protected disks.
Over 270 pages of detailed documentation!

valFORTH	$45.00
General Utilities and Video Editor	40.00
Player Missile Graphics, Character Editor, and Sound Editor	40.00
Display Formatter	35.00
Turtle and valGraphics and Floating Point Routines	45.00
Text Compression and Auto Text Formatting	35.00
Starting Forth (published at $15.95)	14.00
Heavy-Duty Professional Binder (provided free when ordering 3 or more packages)	13.00

∗ Save $50.00 ∗
With an order of all six packages above, you pay only $203.00.

valDOS and valDOS File Editor	$40.00

When ValForth and one or more additional packages are purchased and proof of purchase of APX Forth is furnished, a $15.00 credit will be given.

Plus Shipping and Handling
VISA and MASTERCARD accepted

CIRCLE 296 ON READER SERVICE CARD

and checks answers. The correct answer causes a laser beam to zap the invader off the screen (the instructions say he is being kept in a holding area for relocation). Miss the problem and the invader escapes. When all of the invaders have been captured, the screen displays a space transport that zooms off into nothingness, presumably carrying all of the aliens to a distant galaxy.

Space Scanner

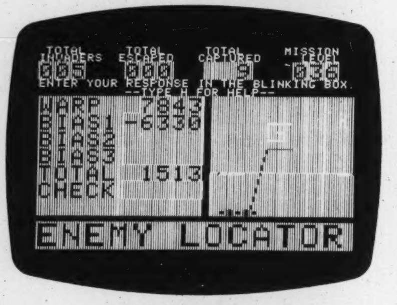
Next we have Space Scanner in which the student is a navigator during an impending alien attack. In order to determine the correct intercept on a Battle Map the student must successfully multiply or divide whole numbers which are called warp and vector values. If the answer to the problem is correct, the enemy ship is destroyed.

After five correct answers the enemy battle star is attacked and demolished. If the intercept is not correct, however, the enemy fighter will fire at the student's ship and inflict 20% damage to the shields. Five wrong answers and that's the end of that interstellar vessel.

In the final two games of this package the student is rewarded with a game within a game. That is, when the math problems are successfully completed, he can use the computer keyboard to control objects on the screen in a similar manner to video arcade games.

Invader Attack

Game number three is Invader Attack in which the student commands a damaged star cruiser with an inoperative photon engine. The student must regulate the amount of fuel force by solving math problems which involve the addition or subtraction of fractions. When a problem is solved correctly the cruiser advances toward the star base. When one is missed, an encroaching enemy ship menaces forward.



```
  TOTAL      TOTAL       TOTAL      MISSION
 INVADERS   ESCAPED    CAPTURED      LEVEL
  005        000           9          036
ENTER YOUR RESPONSE IN THE BLINKING BOX.
          --TYPE H FOR HELP--
WARP      7843
BIAS1    -6330
BIAS2
BIAS3
TOTAL     1513
CHECK
ENEMY LOCATOR
```

Math Competency.

The game is won by reaching the star base. If the student gets to the star base first, all is saved and a primitive video shoot-out commences. If the enemy arrives at the star base first it's all over for the good guys.

Space Mouse

The final game of the series is Space Mouse, the only one that does not involve defending oneself against attacking aliens. Instead, the student takes on the role of a space biologist trying to catch a rare space mouse, presumably for the purpose of observation and study.

The mouse trap is baited with molten cheese when the student successfully solves multiplication and division of fraction problems. When the mouse is caught the student is rewarded with a chance to race him through a maze, which is nerve-wracking but fun.

Playing space-oriented math games would probably serve as a high motivator only for a majority of male students. My four years of experience with thousands of students in free choice computer games situations leads me to the very definite conclusion that most girls do not care one ion about space games. So for girls (who might not be crazy about math to begin with), something needs to be created that would appeal to them as well.

The choice of space games might be a poor one for another reason. If Fried Chicken Supreme serves undeniably the best chicken in the world do you sell chicken when you open your new specialty restaurant next door? Only if you're incredibly naive (or maybe not too bright). Educational games manufacturers have some competition from video games that is tough to beat. If the competition is creating incomparable space games then the educational software people might be wise to create anything *but* space games.

Let's face it, drill and practice of any skill can be pure drudgery. Spending time with the *Zeitgeist Math Competency Series* is much more fun then flipping through a stack of flash cards. On the other hand, there must be a more creative way to involve students in the practice of math skills than what I presented here.

In spite of the superb documentation and clever game ideas, this package does not succeed because the execution of these ideas leaves much to be desired. If a programmer with superior skills in computer animation had tackled these games, the result would have been praiseworthy and priceworthy. ☐

ALF COPY SERVICE
FAST • RELIABLE • LOW COST

If you need your software duplicated quickly and conveniently, ALF's disk copying service is the answer. Most orders are shipped in less than a week. Every disk we copy is verified bit by bit and guaranteed 100% flawless. Standard formats include Atari, Apple (including nibble-copy-proof and double-boot formats), and TRS-80 model 1.

Our "no frills" pricing means you don't have to buy extras you don't need. Of course, we have the frills too — including custom printing and packaging. Call us today for complete details.

BLANK 3M DISK $1.65
BOX OF 100

COPIED 3M DISK $1.95
MULTIPLES OF 50

ALF (303) 234-0871 1448 ESTES DENVER, CO 80215

ALL THE EXCITEMENT . . .
WITHOUT THE QUARTERS!

PACIFIC COAST HWY
Datasoft Inc.
CANYON CLIMBER
T.N.T.
Datasoft Inc.
CLOWNS AND BALLOONS
Datasoft Inc.
SHOOTING ARCADE
soft Inc.

Datasoft™ brings the thrills of a video arcade to your living room with four new programs for your 16K Atari® 400/800 Home Computer. In **Canyon Climber** you explore the beauty and meet the challenges of the Grand Canyon. Face angry goats, fierce Indians and overbearing birds. Next, step up and try your luck at **Shooting Arcade.** Take aim at stampeding elephants, waddling ducks and jumping bunnies. Then, join the tortoise and the hare as they race across **Pacific Coast Highway.** But watch out for rush hour traffic on the road and slippery boats in the water. And finally, run away to the circus in **Clowns and Balloons.** You're in the spotlight as you catapult to the very heights of the big top to bust the balloons. So go to the arcade tonight without leaving your house. Check with your local software dealer or send check or money order with $2.00 postage/handling. California residents, add 6% sales tax.

Available on cassette or diskette. Suggested retail price $29.95

Datasoft Inc.

19519 Business Center Drive
Northridge, CA 91324 • (213) 701-5161

CIRCLE 155 ON READER SERVICE CARD

Atari is a registered trademark of Atari Computer, Inc.

© 1982 Datasoft Inc.™

The Software: **PROGRAMS**

MICROPRO

WordStar®

The number one selling microcomputer word processing package in the world.

8" CP/M®

LIST PRICE: 495.00
MH PRICE: 289.00

5¼" APPLE®

LIST PRICE: 375.00
MH PRICE: 234.00

MICROPRO

MailMerge™

A multi-purpose text-data merging program. One of its most popular uses is producing personalized form letters. Requires WORDSTAR®

8" CP/M®

LIST PRICE: 150.00
MH PRICE: 99.00

5¼" APPLE®

LIST PRICE: 125.00
MH PRICE: 83.00

MAILMERGE, DATASTAR, SPELLSTAR, CALCSTAR, and SUPERSORT are trademarks of MicroPro International, San Rafael, California USA.
QUICKCODE, QUICKSCREEN, anddUTIL are trademarks of Fox & Geller Associates.
VISITREND/VISIPLOT, VISIFILE, VISISCHEDULE, VISIDEX, VISITERM, and DESKTOP PLAN are trademarks of VisiCorp.
dBASE II is a trademark of Ashton-Tate.
MATHSTAR is a trademark of Force Two, LTD.
SUPERCALC is a trademark of Sorcim.
SPELLGUARD is a trademark of Innovative Software Applications.
T.I.M. is a trademark of Innovative Software, Inc.
CROSSTALK is a trademark of MicroStuf.
EASY WRITER and EASY SPELLER are trademarks of Information Unlimited Software.
PERFECT WRITER and PERFECT SPELLER are trademarks of Perfect Software, Inc.
WORDSTAR is a registered trademark of MicroPro International, San Rafael, California USA.
VISICALC is a registered trademark of VisiCorp.
CP/M is a registered trademark of Digital Research.
APPLE is a registered trademark of Apple Computers.
IBM is a registered trademark of International Business Machines.

MICROPRO

DataStar™

The office-oriented system for data entry, retrieval, and updating. DATASTAR allows you to create a form, be it a price list, catalog, or order form. You can edit, update, or save this information in a file or simply print it out. DATASTAR interfaces with MAILMERGE and SUPERSORT.

8" CP/M

LIST PRICE: 350.00
MH PRICE: 235.00

5¼" APPLE®

LIST PRICE: 295.00
MH PRICE: 199.00

MICROPRO

CalcStar™

Financial planning and business decision-making made simpler, faster, and more accurate. CALCSTAR calculates solutions to complex numerical problems in business and finance. CALCSTAR turns your microcomputer's video screen into a 'window' on a gigantic electronic ledger sheet with up to 600 entries arranged the way you want.

8" CP/M®

LIST PRICE: 295.00
MH PRICE: 199.00

5¼" APPLE®

LIST PRICE: 195.00
MH PRICE: 149.00

FORCE TWO, LTD.

MathStar™

MATHSTAR is a combination adding machine/calculator program, designed specifically for use with MicroPro's WORDSTAR®. Provides basic math functions, formatted results, and accounting notation.

8" CP/M®

LIST PRICE: 125.00
MH PRICE: 99.00

5¼" APPLE®

Same as 8" CP/M®

ASHTON-TATE

dBASE II™

THE database management system for the microcomputer.

8" CP/M®

LIST PRICE: 700.00
MH PRICE: 489.00

5¼" APPLE®

Same as 8" CP/M®

FOX & GELLER

QuickCode™

QUICKCODE allows dBASE II users to create the following programs, in a matter of seconds, without programming.

☐ Data entry programs
☐ Data retrieval programs
☐ Date edit/validation programs
☐ Menus
☐ dBASE II files

PLUS: 4 New Data Types:

☐ Date
☐ Dollars
☐ Telephone
☐ Social Security number

QUICKCODE includes a powerful new version of QUICKSCREEN, the dBASE II screen builder.

8" CP/M®

LIST PRICE: 295.00
MH PRICE: 249.00

5¼" APPLE®

Same as 8" CP/M®

FOX & GELLER

dUTIL™

dUTIL is the BASE II utility program which saves valuable computer time and work by:

☐ Increasing command file running time
☐ Creating standard text files to use within your word processor
☐ Automatically debugging dBASE II command files

dUTIL does not require QUICKCODE or QUICKSCREEN.

8" CP/M®

LIST PRICE: 99.00
MH PRICE: 75.00

5¼" APPLE®

Same as 8" CP/M®

Call Toll-Free: **1-800-523-9511** In Pennsylvania: **1-215-868-8219**

The Software: PACKAGES

		CP/M®		APPLE®	
		COMBINED LIST PRICE	MICROHOUSE PRICE	COMBINED LIST PRICE	MICROHOUSE PRICE
MH-1	WORDSTAR® /MAILMERGE	645.00	319.00	500.00	259.00
MH-2	WORDSTAR® /MAILMERGE/DATASTAR	995.00	519.00	795.00	399.00
MH-3	WORDSTAR® /CALCSTAR	790.00	419.00	570.00	299.00
MH-4	WORDSTAR® /MATHSTAR	620.00	369.00	500.00	319.00
MH-5	dBASE II/WORDSTAR® /MAILMERGE	1345.00	819.00	1200.00	719.00
MH-6	dBASE II/QUICKCODE/ WORDSTAR® /MAILMERGE	1640.00	999.00	1495.00	899.00
MH-7	dBASE II/QUICKCODE/dUTIL	1070.00	749.00	1070.00	749.00

Great Savings on Apple® Software and Hardware Accessories.

Microhouse 1444 Linden Street / P.O. Box 498 Bethlehem, Pennsylvania 18016

Prices and specifications subject to change without notice.

All items subject to availability.

MICROHOUSE™

The Microcomputer People.™

CIRCLE 207 ON READER SERVICE CARD

A Symbolic Mathematics System

David D. Shochat

creative computing

SOFTWARE PROFILE

Name: muSimp/muMath-80
Type: Symbolic mathematics programs
System: CP/M, Apple, TRS-80 48K
Format: Disk
Language: Machine
Summary:"Lisp-like" math language
Price: $250
Manufacturer:
Microsoft
10700 Northup Way
Bellevue, WA 98004

The following is a revision of a review of muSIMP/muMATH-79 which originally appeared in SIGPC Notes vol. 4, no. 1/2.

About 20 years ago, I had the opportunity to see a real computer, an IBM 709. When I asked whether it could do calculus, I was told that a digital computer could do numerical differentiation and integration, but that symbolic manipulation of the function definition was inherently outside the domain of the computer.

The muMath software package, developed by Albert D. Rich and David Stoutemyer of the Soft Warehouse and available through Microsoft for 8080/Z-80 disk systems (and now Apple II as well), can do a surprising amount of calculus—symbolically, the way you learn to do it in a calculus class. For example, *muMath* can integrate

```
(1 + X^2)^(1/2)
```

in about seven seconds (on my 2 MHz Z-80 CP/M system). *muMath* can also do exact rational arithmetic, with (up to) 254-byte integers in any number base to 36, a great deal of algebra, some symbolic trig and even matrix algebra: *muMath* will find the inverse of

```
{[1, 2],      or of      {[a, b],
 [3, 4]}                  [c, d]} .
```

Getting all of this to work on a microcomputer with only 64K (or less) is impressive, to say the least. The secret is modular construction. You load only part of *muMath* at a time. It is unlikely, for example, that you will need to do matrix inversion and integration at the same time. The precious memory resources must be used as efficiently as possible, a fact which reflected in the ritual of building and saving the system.

To get started, execute MUSIMP.COM. The muSimp interpreter is loaded in, a sign on message is printed, and the muSIMP "?" prompt appears.

muSimp is the Lisp "surface language" in which *muMath* is written. You may respond to the prompt in several ways.

1. You may make an assignment:

```
S:  13;        (cr)
```

muSimp's response here would be:

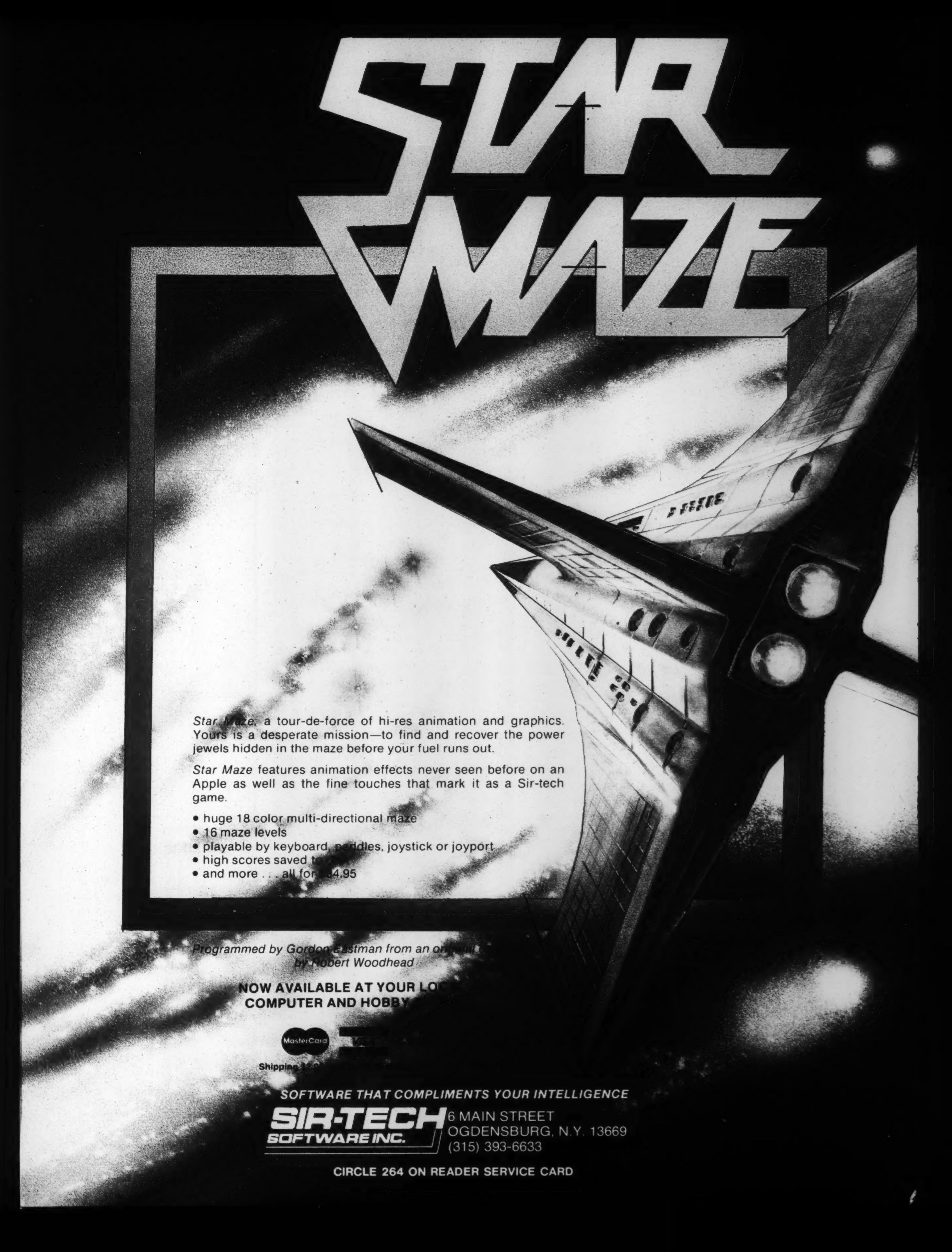
```
@: 13
?
```

2. You may use an existing function:

```
D: S * 4 ;       (cr)
@: 52
?
```

David D. Shochat, Dept. of Mathematics, Santa Monica College, 1910 Dico Blvd., Santa Monica, CA 90405.

STAR MAZE



Star Maze, a tour-de-force of hi-res animation and graphics. Yours is a desperate mission—to find and recover the power jewels hidden in the maze before your fuel runs out.

Star Maze features animation effects never seen before on an Apple as well as the fine touches that mark it as a Sir-tech game.

- huge 18 color multi-directional maze
- 16 maze levels
- playable by keyboard, paddles, joystick or joyport
- high scores saved to
- and more . . . all for $34.95

Programmed by Gordon Eastman from an original
by Robert Woodhead

NOW AVAILABLE AT YOUR LO
COMPUTER AND HOBBY

MasterCard

Shipping

SOFTWARE THAT COMPLIMENTS YOUR INTELLIGENCE

SIR-TECH SOFTWARE INC.

6 MAIN STREET
OGDENSBURG, N.Y. 13669
(315) 393-6633

CIRCLE 264 ON READER SERVICE CARD

3. You may define a new function. (Every line of user input is terminated with a carriage return):

```
FUNCTION COMBS (N, K),
  WHEN K = 0, 1 EXIT,
  N * COMBS (N-1, K-1) / K
ENDFUN $
? COMBS (D, 5);
@: 2598960
?
```

The definition of COMBS, which computes the number of combinations of N things K at a time, shows that recursion is allowed.

```
LISTEXAMPLE: '((1 ONE) (2 TWO)
  (3 THREE)) &
@: ((1 ONE) (2 TWO) (3 THREE))
? FIRST (LISTEXAMPLE) &
@: (1 ONE)
? REST (LISTEXAMPLE) &
@: ((2 TWO) (3 THREE))
? REST (FIRST (LISTEXAMPLE)) &
@: (ONE)
? REST (REST (FIRST (LISTEXAMPLE))) &
@: FALSE
```

(the name FALSE is equivalent to the empty list)

```
? FUNCTION MAPFIRST (LIS),
  WHEN EMPTY (LIS), FALSE EXIT,
  ADJOIN (FIRST (FIRST (LIS)),
    MAPFIRST (REST (LIS)))
 ENDFUN $
? MAPFIRST (LISTEXAMPLE) &
@: (1 2 3)
```

The use of the "&" as a termination symbol instead of ";" indicates to the DRIVER function, which contains the main interaction loop, that the result of the computation should be printed as a list, rather than as a mathematical expression in standard mathematical notation. A "$" means the result should not be printed at all.

```
EXPRESSION: X + Y $
? EXPRESSION ;
@: X + Y
? EXPRESSION &
@: (+ X Y)
```

Internally, only the latter (list) form really exists. But this is almost totally transparent to the user. The DRIVER function mentioned above gets its input through a function called PARSE, which normally expects all of *its* input to be in non-list notation. It is this PARSE function that really defines the difference between muSimp and normal Lisp.

For example, if PARSE sees FUNCTION in the input stream, it translates everything from there to the next occurrence of ENDFUN into a list, which is essentially the Lisp equivalent of that function definition.

In Lisp, everything is a list, including function definitions. In muSimp, PARSE translates both standard mathematical notation, and MuSimp syntax itself into list/Lisp form. So the difference between muSimp and normal Lisp exists only "at the surface."

When PARSE sees a single quotation mark, two things happen. First, it reads what follows in normal list notation. Second, it adds the QUOTE function name onto the expression, which causes the expression to be "taken literally," rather than being evaluated. Thus in the definition of LISTEXAMPLE above, even if we had previously made an assignment

```
ONE: UNO $ ,
```

LISTEXAMPLE would still contain only ONE, rather UNO.

Once a function definition has been made, it becomes a part of the system, which can then be called upon by other function definitions. And that's how you bring *muMath* into the picture, because new function definitions (and other kinds of valid muSimp input), can be read in from disk as well as from the keyboard. For example, if you type:

```
RDS (ARITH, MUS);
```

with the source file ARITH.MUS on the disk in drive A, all the muSimp source code constituting ARITH.MUS will be read in and made a part of the system just as COMBS and MAPFIRST were. Now you can do:

```
1/2 + 1/3 ;
@: 5 / 6
```

muMath is a collection of 15 muSimp source files, all but one of which depend on certain other source files being "in" at the same time. To do definite integrals, for example, you must load in five of these source files.

Any time you want you can save the state of the system on disk including (in internal form) all the muSimp code read in so far, just by typing

```
SAVE (<name>) $
```

(with a disk with enough free space in drive A), where <name> can be any available primary file name for your DOS. muSimp will create a special memory image file with primary name <name> and secondary name SYS. Then you can come back any time and just by typing (while in muSimp):

```
LOAD (<name>) $ ,
```

you will be right back where you were just before the SAVE. Or, another way to do it is to type:

```
MUSIMP <name>
```

as a DOS command, in which case muSimp will LOAD <name>.SYS for you before entering the DRIVER loop.

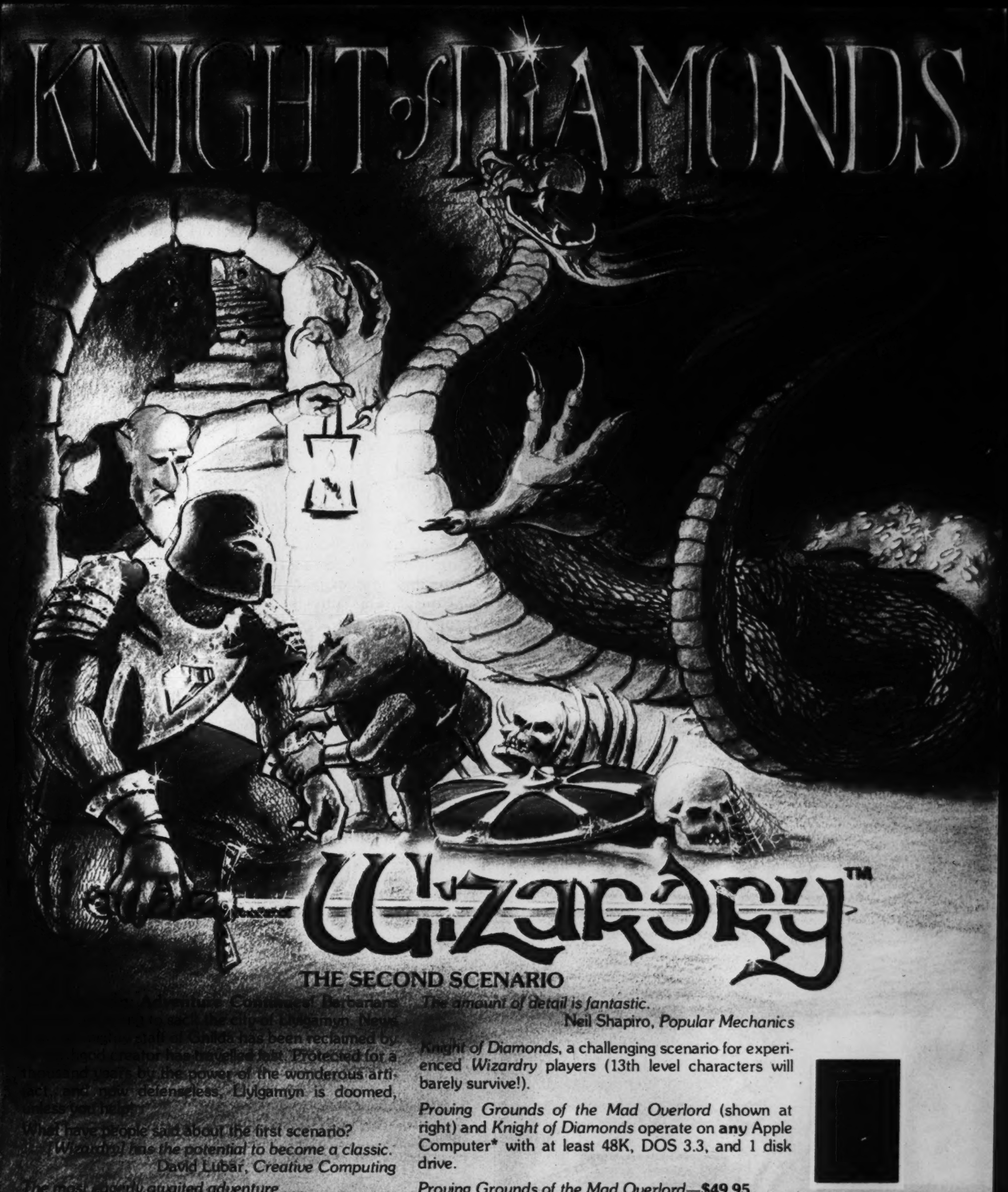
The package comes with ten other source files which are 90% comments. These are the lesson files, which are so well-written they make the process of learning to use the system a great deal of fun. The lesson files are read in like any muSimp source file, but they are echoed at the console and consist mostly of comments, delimited by matching percent signs. Every once in a while, the lesson gives you an exercise to do, ends the comment with a "%", and then makes the assignment:

```
RDS: FALSE $
```

That stops the input from the disk and gives you control of the system to do your exercise. When you're done, you type:

```
RDS: TRUE $
```

and the lesson takes over again. The lesson may also stop being a comment long enough to do an example, providing actual muSimp source to the system. This example may, in turn, depend upon function definitions which you added to the system while doing a previous exercise.



KNIGHT of DIAMONDS

WIZARDRY™

THE SECOND SCENARIO

[illegible] Adventure Continues! Barbarians [illegible] to sack the city of Llylgamyn. News [illegible] staff of Gnilda has been reclaimed by [illegible] creator has travelled fast. Protected for a thousand years by the power of the wonderous artifact, and now defenseless, Llylgamyn is doomed, unless you help!

What have people said about the first scenario?

[Wizardry] has the potential to become a classic.
David Lubar, *Creative Computing*

The most eagerly awaited adventure . . .
Computer Merchandising

. . . perhaps the most advanced adventure program on the market.
Forest Johnson, *The Space Gamer*

The amount of detail is fantastic.
Neil Shapiro, *Popular Mechanics*

Knight of Diamonds, a challenging scenario for experienced *Wizardry* players (13th level characters will barely survive!).

Proving Grounds of the Mad Overlord (shown at right) and *Knight of Diamonds* operate on **any** Apple Computer* with at least 48K, DOS 3.3, and 1 disk drive.

Proving Grounds of the Mad Overlord—**$49.95**
Knight of Diamonds—**$34.95**

Join over ten thousand adventurers exploring the ultimate fantasy experience.

MasterCard VISA C.O.D.

Shipping $2.00 in U.S.; $5.00 outside U.S.

NOW AVAILABLE AT YOUR LOCAL COMPUTER AND HOBBY STORE

*APPLE IS A REGISTERED TRADEMARK OF APPLE COMPUTER, INC.

Sir-tech SOFTWARE, INC.
6 MAIN STREET, OGDENSBURG, N.Y. 13669
(315) 393-6633

CIRCLE 265 ON READER SERVICE CARD

Wizard-SOB™

SERIAL OUTPUT BUFFER CARD

Input a new task while your old task prints out

NO MORE DELAY FOR SLOW PRINTERS

WIZARD-SOB is a serial printer interface that lets you operate your Apple while data from your previous operation is printing out. It ends waiting while your printer prints. The WIZARD-SOB contains a 16K byte "character buffer" that may be expanded to 32K bytes of character buffering. It accepts data at the Apple's rapid transfer rate, stores the data and feeds it to your printer at the rate the printer can accept.

- Fully compatible with all Apple II and Apple II Plus* computers
- Fully compatible with most Apple software including Applesoft BASIC*, Integer BASIC*, CP/M, Pascal, etc.
- Fully compatible with most Apple II expansion boards.
- Low power consumption for cool reliable operation
- Leads soldered directly into board for reliable operation
- Many formatting features.
- Two-year factory replacement warranty
- RS-232 printer interface compatible

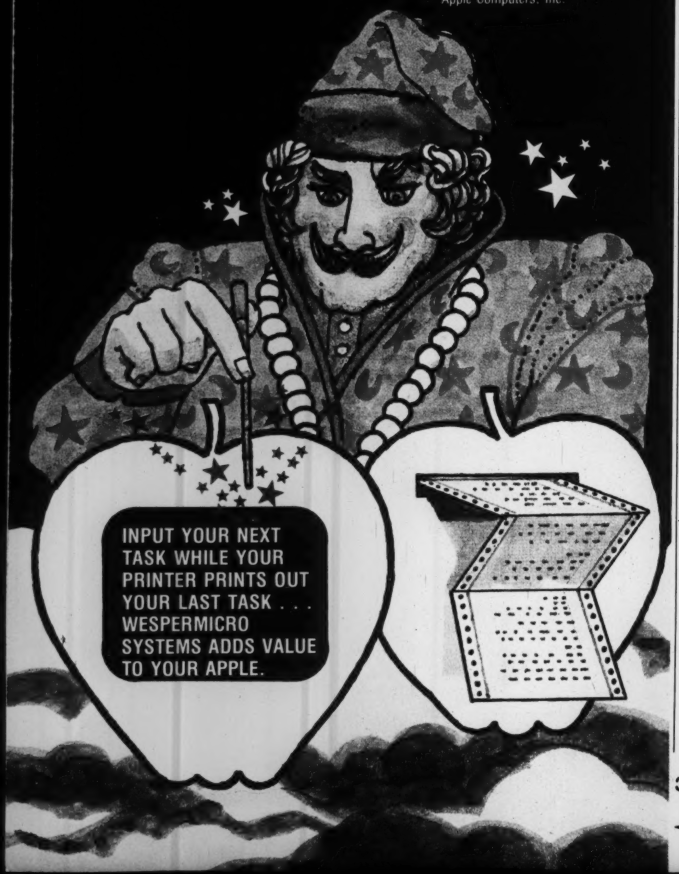
Backed by the world's #1 independent manufacturer of peripheral controllers

Available at all fine Computer Stores $249.00

Telephone (800) 854-8737
(714) 850-1666

WESPER MICRO™ Systems
SUBSIDIARY OF WESPERCORP

*Registered Trademark of Apple Computers, Inc.


INPUT YOUR NEXT TASK WHILE YOUR PRINTER PRINTS OUT YOUR LAST TASK . . . WESPERMICRO SYSTEMS ADDS VALUE TO YOUR APPLE.

muMath, continued...

It all works beautifully as long as you don't try to stop in the middle of a lesson and save what you have done so far. It is possible, but tricky: you must refer to the printed copy of the lesson to see what "finishing up" operations it would have done, do them through the keyboard, and finally SAVE a memory image as usual. When you come back, you will still have to run through the lesson file from the beginning, but now you can skip the exercises you have already done.

Five of the lessons teach the use of those features introduced to the system by the ARITH and ALGEBRA files of *muMath.* After completing them, you can use the other *muMath* files without much difficulty, with the aid of the printed documentation.

The remaining five lessons teach the muSimp language — to a point. The trouble is, they are so beautifully written, you will feel somewhat lost when, after the fifth lesson, you must start learning from the printed documentation, which is much more terse than the lessons. The lessons really "take you by the hand"; the printed material works in a way which is actually similar to the way the system is structured internally: defining itself in terms of itself.

It was a frightening experience at first, trying to learn from the printed discussion of muSimp, but I finally got used to it. After a year and a half, I think I can appreciate the concise style.

The documentation has been improved considerably, since the original muSimp-79 version, but there is still room for improvement. The function READ is not documented at all (probably an oversight).

Considerable information is included about the various property lists used by PARSE, but the definition of PARSE itself is missing—I had to dig out the internal (Lisp) form to see how it works. And it is only by seeing how PARSE works, that some of the documentation which *is* included becomes intelligible.

muMath can handle a wide variety of symbolic math problems, so whenever it fails to come up with an expected solution or simplification, it leaves you wondering why. The only way to find out *why* is to delve into the source files themselves and uncover the methods used by *muMath.* I've also found this to be one of the best ways to learn about important techniques which are not discussed in the lessons or in the printed documentation (such as storing function definitions on property lists).

Another interesting approach is simply to experiment with *muMath.* In the examples which follow, the symbol " → " will mean "simplifies to."

8^(1/2) → 2^(3/2),

but

343^(1/2) doesn't simplify.

This is because ARITH works with a very short list of primes: (2 3 5). If you reassign:

PRIMES: '(2 3 5 7) $

then,

343^(1/2) → 7^(3/2).

Some complex arithmetic is possible (# I is i):

(1 + #I)^2 → 2*#I,

but

(2*#I)^(1/2)

appears to be too much to ask, even with both trig files loaded.

With the LOG file loaded,

LOG (2^X, 2) → X,

(the second argument is the base), and

CIRCLE 299 ON READER SERVICE CARD

```
LOG (8, 2) → 3
```

(an improvement in the latest version).

muMath forces the user to do a certain amount of crucial decision-making by setting what are called control variables. For example, if the control variable NUMNUM has the value 2,

```
2 * (X + 1) → 2 + 2*X,
```

and if NUMNUM is -2,

```
2 + 2*X → 2 * (1 + X).
```

If NUMNUM is 30,

```
(X + 2) * (X + 3) → 6 + 5*X + X^2,
```

but, and this is perhaps the biggest weakness of *muMath;* it cannot factor even a simple quadratic such as the one above. And yet, with the equation-solving files loaded,

```
SOLVE (X^2 + 5*X + 6 = = 0, X)→
  {X= =-2,
   X= =-3} ,
```

even though the former task is easily reducible to the latter. The manufacturer says (in one of the lessons) that they are working on it for future releases.

You would expect:

```
X/(X*Y) → 1/Y,
```

but one day I couldn't seem to make it happen. I finally realized that the problem lay with the control variable EXBAS which needs must be a positive multiple of 2 in order for the cancellation to work. Now EXPBAS being a positive multiple of 2 is supposed to allow such things as:

```
(X*Y)^2 → X^2 * Y^2.
```

In order to make sense out of all this you must realize that internally, a fraction A/B is equivalent to A * B^-1 (actually the list: (* A (^B -1))), so the X*Y in the denominator of the cancellation example is really a factor of the form: (X*Y)^-1, which explains why the state of EXPBAS is so crucial, in a problem which seems to have nothing to do with exponents.

The control variable DENNUM must be a negative multiple of 15 in order to get:

```
1/X + 1/(X + 1)→
(1 + 2*X) / (X * (1 + X)),
```

but then DENDEN must be a positive multiple of 3 if you want the denominator multiplied out, and so it goes.

Guiding *muMath* through a tricky problem of adding rational expressions sometimes seems to take as much skill as doing the problem yourself. Of course, *muMath* is especially impressive with a really tedious problem such as (1 + X)^20 (PWREXPD must be 2).

I have found the trig and calculus capabilities of *muMath* to be surprisingly good: *muMath* will differentiate just about any function you give it, since it knows all the standard rules. Integration is, of course, the real test.

```
INT (1/(X^2 + 5*X + 6), X)→
LN ((-4 - 2*X)/(6 + 2*X)),
```

which can be further simplified only by a subsequent re-evaluation of the answer, with NUMNUM and DENDEN set to -2. A careful study of the two integration source files reveals that the above problem is done by completing the square. Since *nuMath* can't factor quadratics, there is no way it could do the problem by partial fractions. But it is clear, even without examining the source files, that *muMath* really doesn't know anything about partial fractions, since it can't integrate

```
1 / (X^3 + 1),
```

CIRCLE 300 ON READER SERVICE CARD→

Wizard-BPO™

BUFFERED PRINTER OUTPUT

Allows new-task input while old-task prints out.

STOP WAITING FOR SLOW PRINTER OPERATION

WIZARD-BPO is a parallel printer interface that lets you use your Apple while data from a previous operation is being printed. No more wasting of your precious time while your printer prints. The WIZARD-BPO contains a 16K byte "character buffer" that may be expanded to 32K bytes of character buffering. It accepts data at the Apple's rapid transfer rate, stores the data and feeds it to your printer at the rate the printer can accept it.

- Fully compatible with all Apple II and Apple II Plus* computers
- Fully compatible with most Apple II expansion boards
- Fully compatible with most Apple software including Applesoft BASIC*, Integer BASIC*, CP/M, Pascal, etc
- Low power consumption for cool reliable operation
- Leads soldered directly into board for reliable operation
- Many formatting features
- Two-year factory replacement Warranty

Backed by the world's #1 independent manufacturer of peripheral controllers

Available at all fine Computer Stores $179.00

Telephone (800) 854-8737

WESPER MICRO™ Systems

SUBSIDIARY OF WESPERCORP

*Registered Trademarks of Apple Computer, Inc.

NEXT TASK...
WESPERMICRO SYSTEMS TIME-SAVING MICRO-PERIPHERALS ADD VALUE TO YOUR APPLE.

NEW!

AMDEK CORP
the new name for Leedex Corp
AMDEK CORP
the new name for Leedex Corp

Kiss the 5¼" floppydisk goodbye!

Amdek has revolutionized data storage for personal computers with the new AMDISK-3 Micro-Floppydisk drive system. The system consists of 2 drives and a power supply, fully compatible with 5¼" floppy disk drives. The 3" disk is encased in hard plastic, protected from dust and fingerprints, and it's easy to mail.

Just write, or call to receive our data sheet on the new AMDISK-3 Micro-Floppydisk Cartridge system.

- 1 Megabyte (unformatted) storage capacity.
- Track-to-track compatible with 5¼" floppy-disk drives.
- 3" shirt-pocket sized disk cartridge.
- Drive has built-in power supply.

2201 Lively Blvd. • Elk Grove Village, IL 60007
(312) 364-1180 TLX: 25-4786.

AMDEK CORP.

Amdek . . . your guide to innovative computing!

CIRCLE 106 ON READER SERVICE CARD

even if you do the factoring for it. *muMath* appears to be able to do integration by parts, successfully integrating such things as

```
X^2 * #E^X
```

(#E is e), but if you look at the source code, what you find is that *muMath* knows many of the special reduction formulas, which one normally derives using parts. Surprisingly, *muMath* can't integrate

```
X * (1 + X)^(1/2),
```

which is easy using parts.

The latest version of *muMath* (MuSimp/muMath-80) includes three source files which were not in the previous version: TAYLOR.DIF, LIM.DIF, and SIGMA.ALG.

The file TAYLOR.DIF, which consists of a single function definition, generates Taylor polynomials. For example,

```
TAYLOR (TAN (X), X, 0, 5) →
X + X^3/3 + 2*X^5/15 .
```

Expansions about points other than 0 are "multiplied out" whether you like it or not. This turns out to be inherent in the algorithm used, but one can easily define:

```
FUNCTION TAYLOR1 (EX, VAR, POINT,
  ORDER),
  EVSUB (TAYLOR (EVSUB (EX, VAR,
  VAR+POINT), VAR, 0, ORDER), VAR,
  VAR-POINT)
ENDFUN $
```

Now,

```
TAYLOR1 (LN (X), X, 1, 5) →
-1 + X - (-1+X)^2/2 + (-1+X)^3/3
-(-1+X)^4/4 + (-1+X)^5/5.
```

LIM.DIF, as its name suggests, calculates limits, using the differentiation machinery of *muMath*. For example:

```
LIM ((X-SIN (X)) / X^3, X, 0) →
1 / 6 .
LIM ((1 + 2*X)^(3/X), X, 0) →
#E^6 .
LIM (LN (X) / X, X, PINF) →
PZERO .
```

In the first two examples, the limit is understood to be from the right (otherwise an additional argument to LIM must be used). The last example shows the use of PINF, to denote positive infinity, and PZERO, to indicate that the limit of 0 is approached through positive values. If we ask *muMath* to do a more general example, e.g.

```
LIM ((1 + A*X)^(B/X), X, 0);
```

a curious thing happens: *muMath* starts asking for additional information.

```
@:
??? A ???
ENTER SIGN (0 + -)?
```

A single character response of "+" is accepted and the computation immediately resumes, finally producing the expected answer,

```
+E^(A*B) .
```

As you would guess, the file SIGMA.ALG does summations (and products too). For example:

```
SIGMA (K^2, K, 1, 100) → 338350
SIGMA (1/K^2, K, 1, 20) →
17299975731542641 / 10838475198270720
```

In some cases, it can even handle a sum with a variable number of terms:

```
SIGMA (K^2, K, 1, N) →
(1+N-3*(1+N)^2+2*(1+N)^3) / 6
SIGMA (1/2^K, K, 0, N-1) →
(-2+2^(1+N)) / 2^N .
```

Incidentally, if you want the result in another form, you must *re*-evaluate the answer with appropriate flag settings. For example, the above result was obtained even with DENNUM = 3. But then,

```
EVAL (@) → 2-2^(1-N)
```

(The atom @ is always bound to the result of the previous computation.) If LIM.DIF is loaded along with SIGMA.ALG, the prospect of infinite series arises. As far as I can tell, this is limited to geometric and telescoping series (we can't expect miracles). Also, its best *not* to have LIM.DIF loaded unless you need it, as it interferes in an odd way with the finite sum activity of SIGMA, e.g. asking (twice!) for the sign of -LN(2) during the evaluation of a finite geometric series with common ratio 1/2.

When I first started in with *muMath*, it was the symbolic math which fascinated me most. And it is indeed an amazing accomplishment, especially considering the limited memory space. Also, I understand that there are problems in physics and engineering which can be rendered tractible only by using a combination of numerical and symbolic methods.

I really don't know how useful *muMath* would be to a person who doesn't already know the relevant mathematics. I would love to see what would happen with *muMath* in the hands of my beginning algebra students, but I haven't yet had the opportunity. I really believe a person could learn some mathematics just by learning to use *muMath*, but this is only speculation.

What excites me most now is the muSimp language itself. Programming in muSimp involves using, in a very concrete way, the same techniques of inductive definition, building complex structures from simple ones, and then analyzing and operating on those structures inductively, that are fundamental to theoretical work in set theory and logic. It also turns out to be much more useful as a general purpose language than I originally suspected, particularly now that you can easily link muSimp to your own machine language routines.

muSimp is also an excellent bridge between "traditional" programming languages and Lisp. Based on my own experience, I think it would be very easy and natural for anyone accustomed to Pascal or PL/1 to start right in with muSimp, but then when he subsequently (I would say inevitably) discovers Lisp, it will seem natural too. I feel, however, that any further discussion of the muSimp language should be conducted in the context of Lisp itself and Lisp surface languages generally.

The *muMath* package is certainly an impressive piece of work. Although I am particularly interested in its potential as a teaching tool, it will undoubtedly find uses in other areas as well. But at any rate, the time I have spent with *muMath* and muSimp has been challenging and a great deal of fun. ☐

Writing Courseware on the TRS-80

R. Reed Hardy and Eliot S. Elfner

creative computing

SOFTWARE PROFILE

Name: TRS-80 MicroPilot
Type: Programming Language
System: TRS-80 Model I, III, 32K
Format: Disk
Language: Machine
Summary: Easy and direct route to custom C.A.I. software
Price: $79.95
Manufacturer:
Radio Shack
1800 One Tandy Center
Ft. Worth, TX 76102

After using Radio Shack's *MicroPilot* (formerly known as Pilot Plus) to write about 5000 lines of tutorial software, we feel qualified to praise and criticize this version of Pilot.

Pilot has become the generic name for a programming language that is especially well suited for authoring and executing CAI educational programming. There are now several versions of Pilot in fairly common use, each of which has its own strengths and weaknesses.

This review is not intended to be a complete comparison of *MicroPilot* with other versions of Pilot. It is simply a description of the authors' experience with *MicroPilot*.

Let me begin by praising Radio Shack for their initiative in developing *MicroPilot* and thanking them for allowing us to use a pre-publication version so that we could begin authoring programs at least six months earlier than would otherwise have been possible.

Strengths

The strengths of *MicroPilot* lie in its efficiency for educational/interactive programming. With *MicroPilot* you can ask a question, get an answer, evaluate the answer and appropriate feedback with three or four simple commands. You can keep track of a student's progress so that you can automatically start him where he left off when he logs onto the system. All of these characteristics are common to most forms of Pilot.

The features that make *MicroPilot* shine are its edit/run capability, its graphics, its sound generation capability, and its record keeping commands.

There is also a graphics screen generation utility (Graphics/QLT) that allows the user to "draw" a screen and store it on disk for use in programs. These screens are developed during both programming and execution, much more quickly than screens developed using graphics commands in most cases. (Note: this utility will not run on machines without lower case capability.) This screen generation utility can also be used to allow the student to "draw" a screen which can then be saved for later evaluation or simply dumped.

Another *MicroPilot* strength is the editor that is included with the software. The editor is essentially the same as that used for Level II Basic which makes it very convenient for those who are accustomed to using Radio Shack Basic.

During program authoring, *MicroPilot* allows the author to run a program starting with any specified line number, execute any valid *MicroPilot* command directly, break into a program and then reenter the program where it was interrupted by typing "continue." Lines and characters can be edited with ease.

There are other strengths that those who aren't familiar with other versions of Pilot may not appreciate. For example, there are commands to clear the screen and home the cursor (N:), delay program execution for any specified number of seconds (D:N), pause until a key is pressed (W:), and print text on the printer instead of the screen (P:).

These are functions that can be accomplished with other versions of Pilot by using ASCII codes or other roundabout methods, but *MicroPilot* makes their use a breeze. Another advantage relative to other versions of Pilot is that the author can run a program without loading special execution software. This makes editing and general debugging much faster.

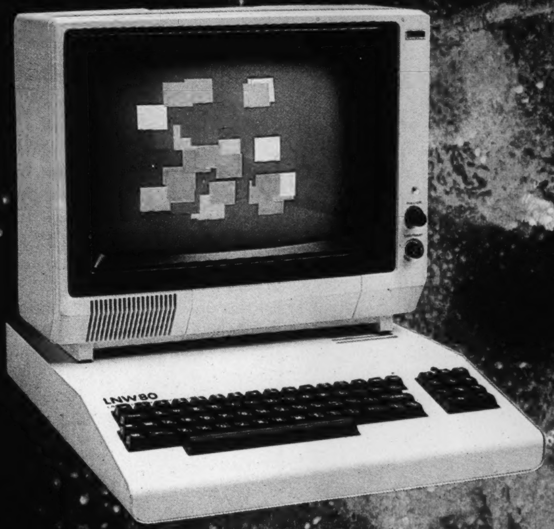
Given all of the above praises, you may

Dr. R. Reed Hardy, Associate Professor of Pyschology, St. Norbert College, De Pere, WI 54115.

Dr. Eliot S. Elfner, Associate Professor of Business Administration, St. Norbert College, De Pere, WI 54115.

galaxy of features

A GALAXY of features makes the **LNW80** a remarkable computer. As you explore the **LNW80**, you will find the most complete, powerful, ready to run, feature-packed personal and business computer ever made into one compact solid unit.



MODEL I COMPATIBILITY – The **LNW80** is fully hardware and software compatible with the Model I. Select from a universe of hardware accessories and software – from VisiCalc® to space games, your **LNW80** will launch you into a new world of computing.

FULLY LOADED – A full payload includes an on-board single and double density disk controller for 5 ¼" and 8" single or double sided disk drives. RS232C communications port, cassette and parallel printer interfaces are standard features and ready to go. All memory is fully installed – 48K RAM, 16K graphics RAM and 12K ROM complete with Microsoft **BASIC.**

QUALITY CONSTRUCTION – Instrumentation quality construction sets **LNW80** computers apart from all the rest. Integrated into the sleek solid steel case of the **LNW80** is a professional 74-key expanded keyboard that includes a twelve key numeric keypad.

HIGH RESOLUTION GRAPHICS & COLOR – The stunning 480 × 192 resolution gives you total display control – in color or black and white. The choice of display formats is yours; 80, 64, 40 and 32 columns by 24 or 16 lines in any combination of eight colors.

PERFORMANCE – Lift-off with a 4MHz Z80A CPU for twice the performance. The **LNW80** outperforms all computers in its class.

Our down to earth price won't send you into orbit

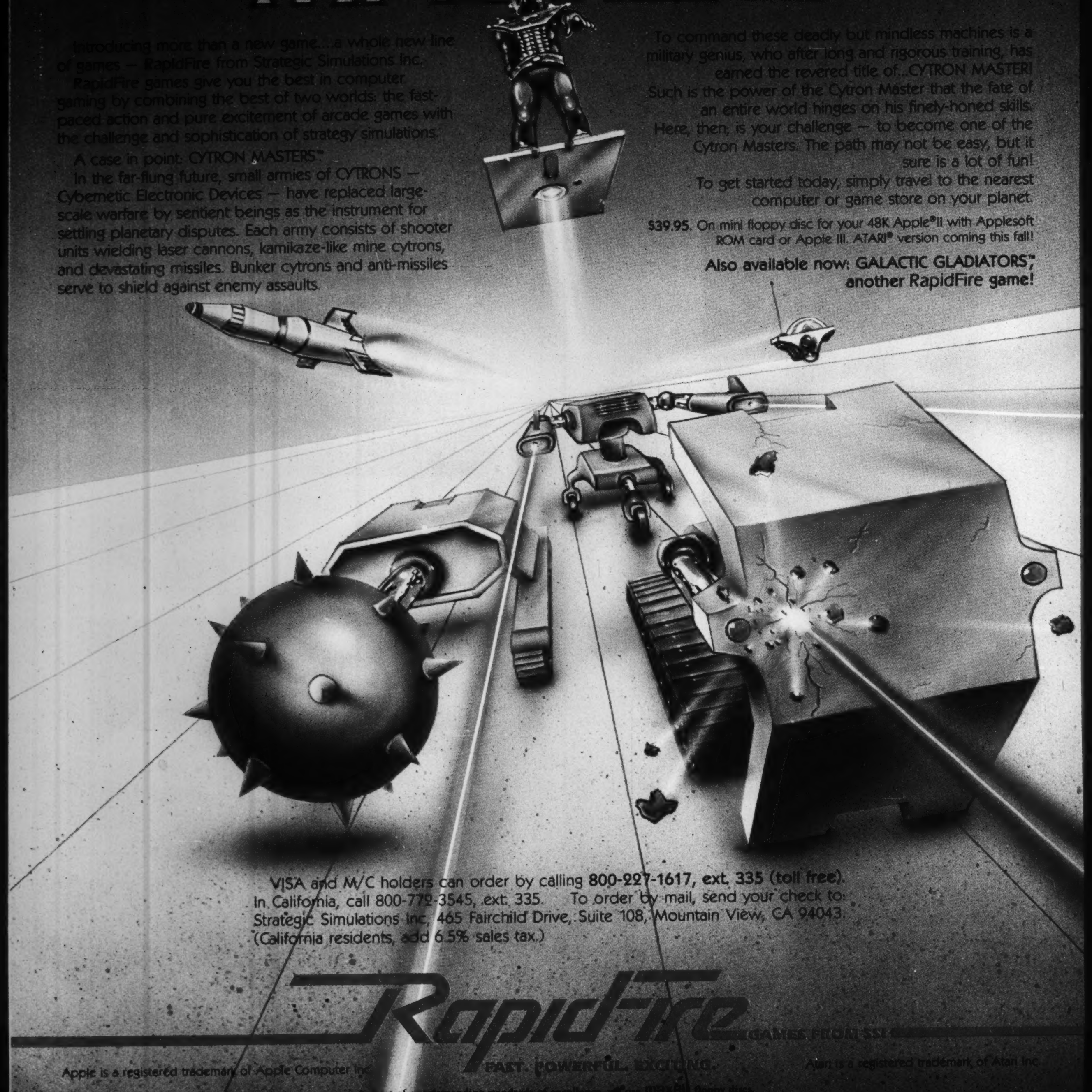
LNW Research Corp.
2620 WALNUT Tustin, CA 92680
(714) 641-8850 (714) 544-5744

CIRCLE 194 ON READER SERVICE CARD

Monitor and Disk drives not included
TM Personal Software, Inc.

THE LINE IS RAPIDFIRE.
THE GAME IS....

CYTRON MASTERS



Introducing more than a new game....a whole new line of games — RapidFire from Strategic Simulations Inc.

RapidFire games give you the best in computer gaming by combining the best of two worlds: the fast-paced action and pure excitement of arcade games with the challenge and sophistication of strategy simulations.

A case in point: CYTRON MASTERS™.

In the far-flung future, small armies of CYTRONS — Cybernetic Electronic Devices — have replaced large-scale warfare by sentient beings as the instrument for settling planetary disputes. Each army consists of shooter units wielding laser cannons, kamikaze-like mine cytrons, and devastating missiles. Bunker cytrons and anti-missiles serve to shield against enemy assaults.

To command these deadly but mindless machines is a military genius, who after long and rigorous training, has earned the revered title of...CYTRON MASTER!

Such is the power of the Cytron Master that the fate of an entire world hinges on his finely-honed skills.

Here, then, is your challenge — to become one of the Cytron Masters. The path may not be easy, but it sure is a lot of fun!

To get started today, simply travel to the nearest computer or game store on your planet.

$39.95. On mini floppy disc for your 48K Apple®II with Applesoft ROM card or Apple III. ATARI® version coming this fall!

Also available now: GALACTIC GLADIATORS™, another RapidFire game!

VISA and M/C holders can order by calling **800-227-1617, ext. 335 (toll free).** In California, call 800-772-3545, ext. 335. To order by mail, send your check to: Strategic Simulations Inc, 465 Fairchild Drive, Suite 108, Mountain View, CA 94043. (California residents, add 6.5% sales tax.)

RapidFire GAMES FROM SSI

FAST. POWERFUL. EXCITING.

Apple is a registered trademark of Apple Computer Inc.

Atari is a registered trademark of Atari Inc.

As part of our demanding standards of excellence, we use maxell floppy discs.

CIRCLE 280 ON READER SERVICE CARD

be beginning to think that *MicroPilot* is nearly perfect. Well, don't run out and buy it without finishing this article. Along with its strenths, *MicroPilot* has several significant weaknesses.

Weakness

Probably the single most damaging weakness in *MicroPilot* is the fact that the student user has very easy access to the program. Any student with elementary programming ability can list a program, change it, and save it with little difficulty.

These operations can be done only while the user is in "command" mode, and when a *MicroPilot* program is running, the student would not normally be able to do any of the above dastardly deeds. However, there are several ways a student can find himself in command mode. The following is a list of some of these:

1) Since the Model I version of *MicroPilot* does not come with an Initial Program Load utility (I.P.L. utilities automatically begin the execution of a specified program when the computer is turned on), the student must either be supervised during initial program load or he must load and run his own program from the *command mode*.

2) Since *MicroPilot* has no ON ERROR GO TO command or its equivalent, *any error* (e.g., the student enters an O when the program expects 0, or makes an error in giving his log-on file code) will cause the program to crash and come down in *command mode*.

3) In addition to the above problems, there is no easy way to disable the Break key which halts execution and puts the user in *command mode*.

Before *MicroPilot* can be considered a serious educational tool, this easy access to command mode must be corrected. In other versions of Pilot, this has been done by separating the program execution software from the authoring software. This effectively prevents the listing or modification of programs by the student. If a program crashes under such circumstances, the student user can usually do only one of two things; 1) seek help from an assistant, or 2) type run and start again. This is as it should be.

As things stand with *MicroPilot*, a reasonably competent programmer could list test items and, by interpreting the program, get the correct answers before taking the test. An even more insidious possibility is that the student could directly modify his disk file indicating perfect performance on all unit quizzes without ever going through the course. This characteristic of *MicroPilot* makes it unsuited to some CAI applications.

While the easy access to command mode is the major problem with this version of TRS-80 *MicroPilot*, there are a few other software characteristics that make for programming difficulties:

The programmer cannot POKE a value into a memory location in MicroPilot, nor can he call and execute a machine language program.

There is no way to check the DOS Directory from *MicroPilot*, or to specify the drive number when loading and saving programs and/or student records.

The documentation of the record keeping command is so unclear and incomplete that the programmer literally has to find out for himself by trial and error how the commands work and what they do. (Note: *Always* be sure you close a file immediately after reading or writing, or you could clobber the directory on your disk and lose access to all the programs on that disk.)

The general documentation that is sold with MicroPilot assumes no former programming on the part of the user.

The general documentation that is sold with *MicroPilot* assumes no prior programming experience on the part of the user. Thus, it is very awkward and inefficient for the user who already has a programming background.

A disadvantage of *MicroPilot* relative to Basic is that it is limited to 32K, disk configurations of the TRS-80 Model I, or Model III. Thus, those with 16K, level II machines cannot use courseware developed in *MicroPilot*. However, courseware programmed in Level II Basic could be used in such configurations.

MicroPilot vs. Basic

Some comments are appropriate on the relative merits of *MicroPilot* and Basic as CAI courseware authoring languages. Basic is a full-fledged, flexible, programming language, capable of a wide variety of programming applications, including the development of CAI courseware. However, mastering Basic requires a great deal of programming skill, and expertise.

MicroPilot, on the other hand, can be implemented in simple applications quite easily. Almost anyone wishing simply to present some material, and check for understanding, could pick up the *MicroPilot* syntax quickly. However, taking advantage of the complete range of *MicroPilot* commands, and linking contingent feedback and progress skillfully, as required in good CAI courseware, demands the same level of ability and skill required of a Basic programmer. It seems that intricate CAI courseware would be equally difficult to program with either *MicroPilot* or Basic.

So if you are already a hot-shot Basic programmer you can probably get along without *MicroPilot*, but if you are expecting to limit your programming to educational and especially tutorial programming, you will probably find Radio Shack TRS-80 *MicroPilot* the easiest and most direct route to writing excellent software. ☐

MADAME OLGA
SEES ALL, KNOWS ALL
chese

"Just hang on, I'm running a search!"

It's Academic

Patricia D. Glenn

Did you buy an Apple II because "The kids can learn with it?" Or do you have an Apple or two in your classroom for Computer Assisted Instruction? Have you discovered that existing CAI courseware is either too expensive or not available for the courses you want to teach? Are your programming skills too limited to allow you to write your own lessons?

If you answered yes to most of these questions, then DataTech has a *partial* solution for you. This company has created an authoring system for courseware development to be used by the parent or teacher with limited computer experience. The program is called *Mentor. Mentor* should not be confused with Pilot, Logo or Ticcit as it is not a CAI authoring language. It is, instead, a programmed template that allows an educator to prepare instructional units composed of text, questions and graphics.

Structure

The *Mentor* user needs to know only how to insert a disk in the drive, turn on the Apple and type. The program is self-instructing. However, because the program uses a unique DOS, it *is* necessary to insert the disk before turning on the computer. This is clearly indicated on the first page of the documentation.

The copy-protected program disk is called the *Mentor* Master and is used to create student diskettes. When the *Mentor* Master disk is booted, you are greeted by several text pages describing what you are about to do. This is followed by the *Mentor* Master Index consisting of nine options numbered 0 to 8 (see Figure 1).

Figure 1.

Mentor Master Index

0 - Run the Demonstration *Mentor* Program
1 - How to Construct a Complete Student Diskette
2 - Copy the Mentor Program onto a Blank Diskette
3 - Write a New Instructional Unit to be Added to a Student Diskette
4 - Read, Edit or Add to an Existing Instructional Unit
5 - Copy a Picture From One Diskette Onto Another
6 - Create, Change or Verify Table of Contents
7 - Read the Catalog of a Diskette
8 - The Game Show Index (only on disk containing The Game Show)

creative computing

SOFTWARE PROFILE

Name: Mentor Master and The Game Show

Type: CAI Authoring and playback system

System: Apple II+, 48K

Format: Disk (Apple DOS 3.3)

Language: Applesoft

Summary: Of its type, good for the price

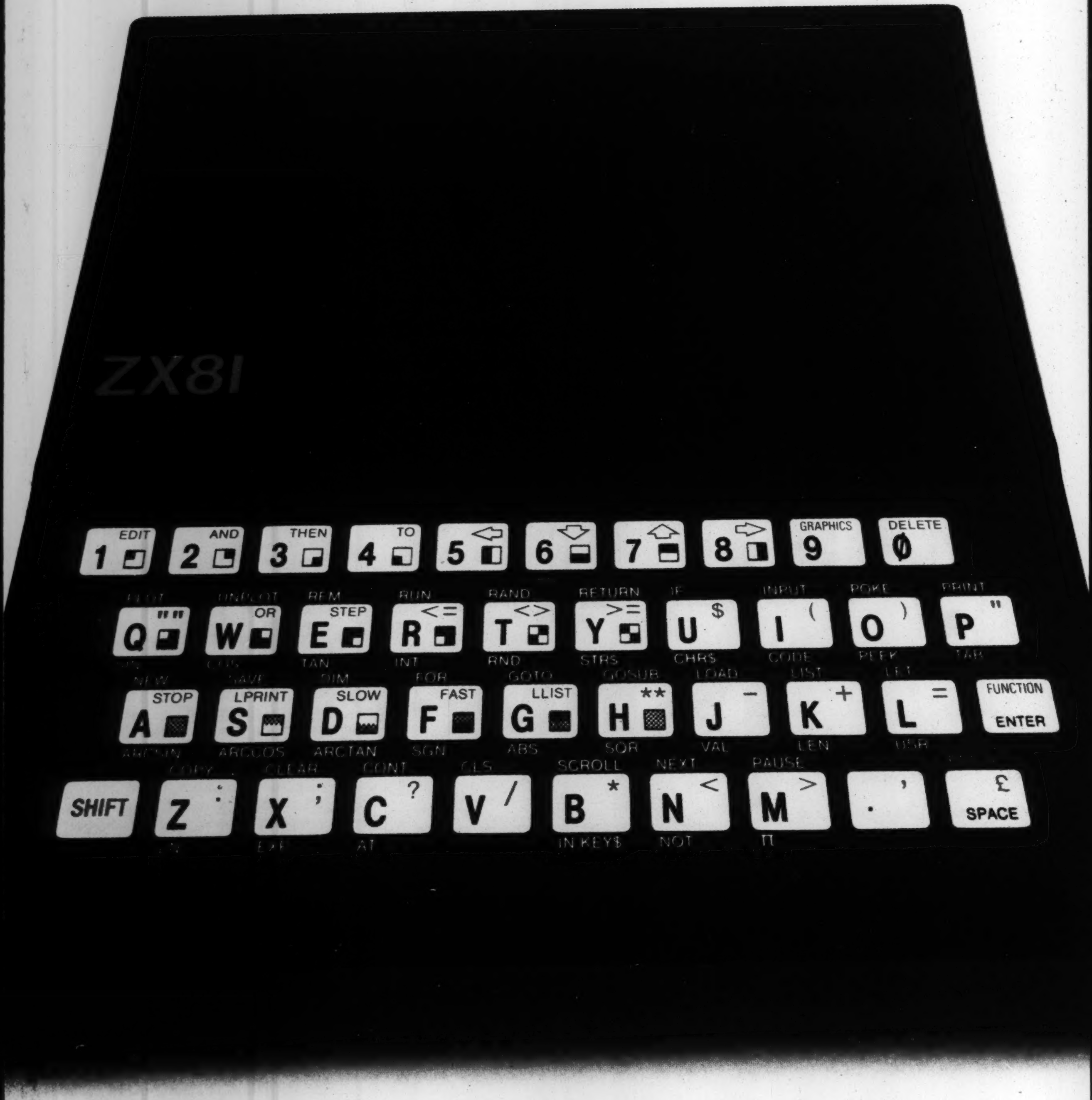
Price: Mentor Master diskette and manual $39.50
Mentor Master and The Game Show diskette and manual $62.00
Picture File Diskettes:

Geology	$31.00
Oceanography	23.50
Space Science	29.50
Meteorology	29.50
Human Anatomy	25.00
Plant Anatomy	20.50
Cells/Genetics	25.00

Manufacturer:
DataTech Software Systems
19312 East Eldorado Dr.
Aurora, CO 80013

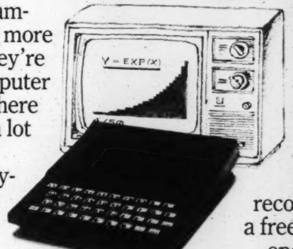
Patricia D. Glenn, 1599 Melrose Ave., Columbus, OH 43224.

Finally you can afford to satisfy your lust for power.


ZX81
EDIT 1
AND 2
THEN 3
TO 4
5
6
7
8
GRAPHICS 9
DELETE 0
PLOT Q "" SIN
UNPLOT W OR COS
REM E STEP TAN
RUN R <= INT
RAND T <> RND
RETURN Y >= STR$
IF U $ CHR$
INPUT I (CODE
POKE O) PEEK
PRINT P " TAB
NEW A STOP ARCSIN
SAVE S LPRINT ARCCOS
DIM D SLOW ARCTAN
FOR F FAST SGN
GOTO G LLIST ABS
GOSUB H ** SQR
LOAD J - VAL
LIST K + LEN
LET L = USR
FUNCTION ENTER
SHIFT
COPY Z : LN
CLEAR X ; EXP
CONT C ? AT
CLS V /
SCROLL B * INKEY$
NEXT N < NOT
PAUSE M > π
. ,
£ SPACE

For $99.95 you can have a full powered personal computer.

Most people know by now that the ZX81 from Sinclair Research is the lowest priced personal computer in the world.



Sinclair programs are available

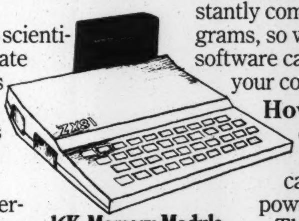
But serious programmers are looking for more than a low price. They're looking for true computer power. And that's where the ZX81 surprises a lot of people.

Just look at the keyboard and you'll get some idea of the ZX81 's power. It has more than 60 BASIC commands, 20 graphic symbols, and complete mathematical functions. And there's even more power that you can't see.

A breakthrough in personal computers. The ZX81 offers features found only on computers costing two or three times as much.

Just look at what you get:

- Continuous display, including moving graphics
- Multi-dimensional string and numerical arrays
- Mathematical and scientific functions accurate to 8 decimal places
- Unique one-touch entry of key words like PRINT, RUN and LIST
- Automatic syntax error detection and easy editing
- Randomize function useful for both games and serious applications
- Built-in interface for ZX Printer
- 1K of memory expandable to 16K
- A comprehensive programming guide and operating manual



16K Memory Module

The ZX81 is also very convenient to use. It hooks up to any television set to produce a clear 32-column by 24-line display. And you can use a regular cassette recorder to store and recall programs by name.

What you get. When you order your ZX81, you get everything you need to start programming.

It comes with connectors for your TV and cassette recorder, an AC adaptor, and a free programming guide and operating manual that completely documents the capabilities of the ZX81.

Options and add-ons. Like any full-powered computer, the ZX81 can be expanded and upgraded.

Its 1K memory can be expanded to over 16K just by plugging the Sinclair Memory Module onto the back of the unit. The cost is only $49.95.

Sinclair has also published pre-recorded programs on cassettes for your ZX81. We're constantly coming out with new programs, so we'll send you our latest software catalog when you order your computer.

How did we do it? The question most often asked about the ZX81 is, "How can so much computer power cost so little money?"

The answer is that Sinclair Research simply took a different approach. Our only goal was to make programming power as affordable as possible. So we developed a radical new design that cuts costs dramatically without cutting computer power. For example, our unique Master Chip replaces as many as 18 chips used in other personal computers.

The success of the ZX81 speaks for itself. It is now the fastest-selling personal computer in the world. And we stand behind our product. If anything goes wrong in the first 90 days, we'll repair or replace your unit free of charge. Even after that, you can take advantage of our national service-by-mail facilities for a minimum fee.

Order now and try it out for 10 days. Simply send the coupon along with a check or money order. For faster delivery, call our toll-free number and use your MasterCard or VISA.

You have 10 days to try out the ZX81. If it isn't all we say it is, just send it back and we'll refund your money.

Why wait any longer? With the Sinclair ZX81, you can finally afford to have the computer power you've always wanted.

Call toll free 800-543-3000. Ask for operator #509. In Ohio call: 800-582-1364; in Canada call: 513-729-4300. Ask for operator #509. Phones open 24 hours a day, 7 days a week. Have your MasterCard or VISA ready.

These numbers are for orders only. If you just want information, please write: Sinclair Research Ltd., 2 Sinclair Plaza, Nashua, NH 03061.

Free guide to programming

To order call toll free: 800-543-3000.

AOCC

MAIL TO: Sinclair Research Ltd.,
One Sinclair Plaza, Nashua, NH 03061.

	PRICE*	QTY.	AMOUNT
ZX81	$99.95		
16K Memory Module	$49.95		
Shipping and Handling	$4.95		$4.95
*U.S. dollars		TOTAL	

Name

Address

City State Zip

Sinclair technology is also available in Timex/Sinclair computers under a license from Sinclair Research Ltd.

sinclair

Mentor Master, continued...

Lesson Development

The Index suggests "If this is your first time, select #0 then #1." Selecting Option #0 provides you with a rather uninspiring demonstration program. Next, you select Option #1: "How to Construct a Complete Student Diskette." This option is four pages of text referring to four other options, giving some cautions and eventually referring you to Option #2: "Copy the *Mentor* program onto a blank diskette."

If you are still undaunted, you select Option #2 when you are returned to the Index. There, you are presented with two more pages of explanatory text and a list of directions to follow. If you follow the directions faithfully, you will have a student diskette at the end of the process.

Returning to the Index, you decide to try Option #3: "Write a New Instructional Unit." A word of caution: plan your lesson on paper first. *Mentor* lessons are tutorials and have the following form:

1. Information.
2. Question.
3. Student Response.
4. Feedback.
5. Explanatory text for the next question.

If the teacher has not structured the lessons adequately, the result will be worse than useless. Tutorial lessons of the type produced by *Mentor* will only be as interesting as the thought put into their preparation make them. Creativity of presentation lies with the teacher, not the program. This process is time-consuming, but ultimately worthwhile.

Finally, in Option #3, you begin writing your instructional unit. First, you will be asked the title of your unit. As instructed, write down the *exact* title of your instructional unit, as you will need it later when preparing the table of contents. Each student diskette can contain up to eight instructional units, depending on the number of pictures used and the length of the question.

Next, you are asked to type in the name of the picture to be used with the unit. Inserting the picture itself is a separate operation under Option #5. Units may be prepared without pictures, and there can be only one picture per unit.

Following the picture name, you are instructed to write an introduction to the unit. This introduction can be review, discussion or any text that will fit into the eight text "pages" of up to seven lines provided for by the program.

Following the introduction, there is room for up to 97 true/false, multiple choice or fill-in (one word only, exactly as spelled by the teacher) questions which can refer to the picture for the unit. Only those questions coded for a picture will offer it and students can toggle back and forth between the picture and the text.

After each question, there is a provision for eight to twelve further lines of text. This text can be an explanation of the question, discussion, new material or whatever you wish. Normally, the test is immediately followed by a question about the material. After the unit is completed and the picture added, the table of contents is created and the unit is complete. Not bad for $39.95. But there's more....

Editing Completed Units

As the teacher is entering the questions and text when preparing an instructional unit, there is no need to worry about hyphenation or truncation of words as text arrangement is taken care of by a word processing sub-routine within the program. This allows text to be entered without concern for margins, which is a nice touch.

If, in spite of the self-instructing features of *Mentor*, you make a mistake in your instructional unit, you can correct it with the editor (see Figure 2), which allows you to make changes in questions or text, add questions, or delete entire instructional units.

Figure 2.

Editor Menu

1 - Transfer Existing Unit From Diskette Into the Computer's Memory
2 - Add More Questions to the Unit Now in the Computer's Memory
3 - Scan Entire Unit Now in Computer's Memory
4 - Edit Unit Now in Computer's Memory
5 - Change in Use/Standby Status of Questions in Computer's Memory
6 - Transfer Unit to Permanent Storage on Diskette
7 - Return to *Mentor* Master Index
8 - Delete a Picture or Instructional Unit

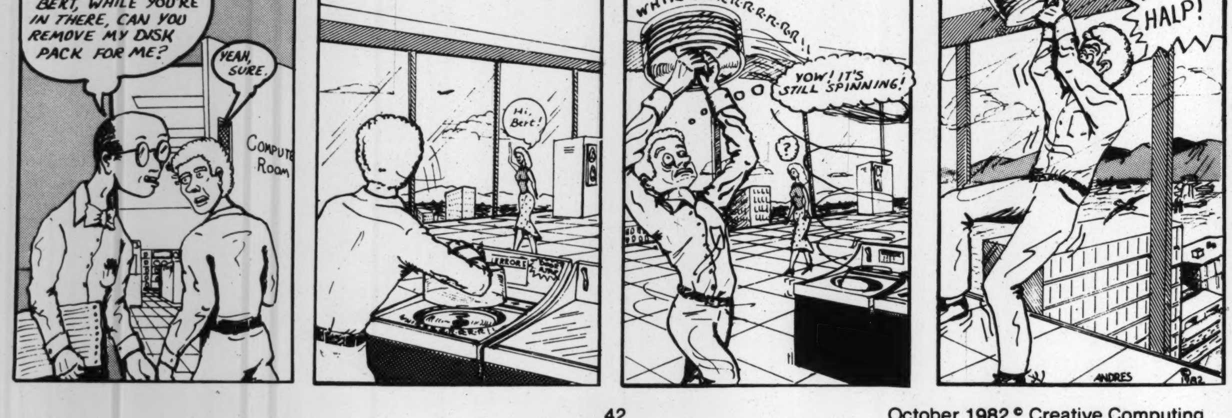
The Game Show

What about The Game show? The $62.00 version of the *Mentor* disk includes a program called The Game Show. This is an animated hi-res graphic shoot-'em-up loosely based on video games of the same type. It is intended for two players or two groups of players and shows an

---

Bit Pit

Chas Andres


BERT, WHILE YOU'RE IN THERE, CAN YOU REMOVE MY DISK PACK FOR ME?
YEAH, SURE.
COMPUTE Room
Hi, Bert!
ERRORS
WHIRRRRRRRRR!!
YOW! IT'S STILL SPINNING!
?
HALP!
ANDRES

Explore the excellence of your ZX81 with a

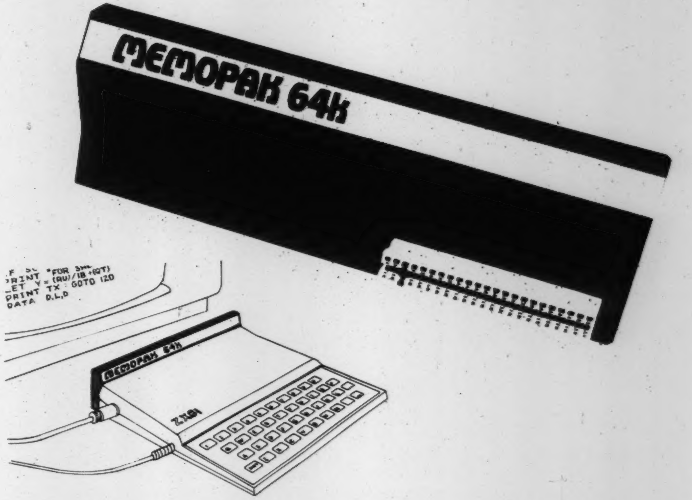
MEMOPAK

MEMOPAK

MEMOPAK

MEMOPAK

MEMOPAK



MEMOPAK 64k memory extension for $179.95

Give your diminishing memory more byte.

MEMOPAK 64K RAM $179.95

The Sinclair ZX81 has revolutionized home computing. The MEMOPAK 64K RAM extends the memory of ZX81 by a further 56K to a full 64K. It is neither switched nor paged and is Directly Addressable. The unit is user transparent and accepts such basic commands as 10 DIM A (9000). It plugs directly into the back of ZX81 and does not inhibit the use of the printer or other add-on units. There is no need for an additional power supply or leads.

Description of memory

0-8K . . . Sinclair ROM

8-16K . . . This section of memory switches in or out in 4K blocks to leave space for memory mapping, holds its contents during cassette loads, allows communication between programs, and can be used to run assembly language routines.

16-32K . . . This area can be used for basic programs and assembly language routines.

32-64K . . . 32K of RAM memory for basic variables and large arrays. With the MEMOPAK 64K extension the ZX81 is transformed into a powerful computer, suitable for business, leisure and educational use, at a fraction of the cost of comparable systems.

MEMOTECH

Memory Extention Specialists

Memotech Corporation
7550 West Yale Ave., Suite 200
Denver, Colorado 80227
Ph.(303) 986-1516

MEMOPAK 16K RAM $59.95

With the addition of MEMOPAK 16K, your ZX81 will have a full 16K of Directly Addressable RAM. It is neither switched nor paged and enables you to execute longer and more sophisticated programs and to hold an extended data base.

The 16K and 64K Memopaks come in attractive, custom-designed and engineered cases which fit snugly on to the back of the ZX81 giving a firm connection.

Free service on your MEMOPAK

Within the first six months, should anything go wrong with your MEMOPAK, return it to us and we will repair or replace it free of charge.

Try MEMOPAK with no obligation

You can use our MEMOPAK in your home without obligation. After 10 days if you are not completely satisfied, simply return it for a full refund.

Coming soon . . . . .

A complete range of ZX81 plug-in peripherals:

MEMOTECH Hi-Res Graphics
MEMOTECH Digitising Tablets
RS232 Interface
Centronic Interface and
Software Drivers

All these products are designed to fit "piggy-back" fashion on to each other and use the ZX81 power supply.

Further information forthcoming.

Memotech Corp. 7550 W. Yale Ave. Suite 220 Denver, Colo. 80227

Yes! I would like to try the Memopak. I understand that if I'm not complete satisfied, I can return it in 10 days for a full refund.

☐ **Check**
☐ **Visa**
☐ **MC**

	Price †	Qty.	Amount
Memopak 64k RAM	$ 179.95		
Memopak 16k RAM	$ 59.95		
Shipping and Handling	$ 4.95	———	$ 4.95
		Total	

Act. No. ____________ **Exp.** ______

† U.S. Dollars

Name ____________________

Street ____________________

City ____________ **State** ____________ **Zip** ____________

CC-10

CIRCLE 200 ON READER SERVICE CARD

alien starship shooting missiles at the players' shuttle craft. It is operated entirely from the keyboard, using the #1 key and the #0 key to fire at the missiles.

Each player tries to shoot down the alien missile on the opposite side of the screen. The first player to hit an alien missile gets four points for a direct hit, or two points for a disabling hit. In order to keep the points gained, the player must immediately give the correct answer to a question. The questions are the true/false and multiple choice questions from the instructional units, and include the pictures used in the units.

Different units may be combined to make up the question set for The Game Show although there can still be only one picture per unit. The instructional units are easily converted for use in The Game Show through the options included in the Game Show Index.

Educational Value

How you feel about the educational value of the *Mentor* progam will depend to a great extent on your philosophy of the proper uses of CAI. If you feel that CAI should deal exclusively with "microworlds," extensive hypothesis testing, variable manipulations and education-oriented languages such as Logo, then *Mentor* is clearly destined to be a disappointment. Frankly, *Mentor*-authored tutorials are of the "electronic page turner" variety.

However, for $39.95 it is probably unreasonable to expect much more than that from the program. But what it does, it does very well. It allows a teacher to present specific information to the student, and to be reasonably certain that the student understands it.

Currently, and in the forseeable future, there is a place for such a program within the educational establishment. If tutorials and drill and practice programs are a means for increasing the acceptance of computers in the schools, then they should be used.

The Mentor program tries very hard to be user-friendly to the inexperienced computer user.

Program Design

The *Mentor* program tries very hard to be user-friendly to the inexperienced computer user. In fact, it tries so hard that it is decidedly *unfriendly* to anyone with even basic computer skills. For example, in trying to meet the needs of a user with only one disk drive, the program makes no provision for using two drives. Considering the amount of disk swapping that is necessary simply to prepare a student diskette, it would be desirable to have the capacity to use two drives if they were available.

The disk is copy-protected and unlistable, so it is impossible to modify the program. This copy protection is probably responsible for most of the program design problems I have found.

The program has two responses to the student's input: "You're right," and "Sorry, try again." This, I think, ignores one of the strengths of CAI—the use of varied motivational techniques—and there is no way for the teacher to change these responses.

When I prepared my first instructional unit, I didn't know the program would accept only one-word fill-in answers. My question required two words. When the student diskette was run, the program crashed when it came to the fill-in and refused to go any further. No matter what I entered, it endlessly repeated "Sorry, try again." The only escape was the RESET key.

Beginning to study a *Mentor* unit is a lot like going down the first hill on a roller coaster. The only way to get off is to ride it to the end. Once a student has begun a unit, the only exits are completing the unit or hitting the RESET key. If you must stop, you will have to begin the unit again.

Students are given three opportunities to answer, and are then given the correct answer, which must be entered before the program will proceed. The learning process could probably have been better served by having the program branch to an explanation of the troublesome material after two or three incorrect answers. If this is too complex, perhaps it could at least return to the explanatory material presented earlier.

Mentor makes no provision for class management. The teacher has no way of knowing who has used the unit, what units they studied, how well they did, or what their problem areas were. This kind of feedback is essential. It is through a knowledge of how course material is being used that a teacher is able to refine the presentation. I suspect this lack is caused by the author's determination to get the entire program and all the instructions on one disk. I would rather have had a management system with the instructions in the printed documentation. Still, for the price, I am probably asking for too much. *Mentor* is not a bad program although it could be less "author-friendly" and more "student-friendly."

The Picture Disks

DataTech has prepared a series of seven Picture File Diskettes, all in the natural sciences (see Figure 3). These disks contain generally good, clear hi-res graphics of common textbook diagrams (see Figure 4). Each diagram has the important points marked by either a letter or a number for ease of reference. Occasionally, it is difficult to determine what a letter is referring to, unless the student is familiar with a line drawing of the object (see Figure 5).

The Picture Files would be useful from middle school through introductory college courses.

The Picture Files would be useful from middle school through introductory college courses. The graphics are in full color, but are understandable in black and white. If you are teaching a course for which Picture Disks are available, and do not have the capability to do your own graphics, the DataTech disks will do much to enhance your *Mentor* presentation, and at a reasonable price. They are one of the best features of the program.

If you can do your own graphics, *Mentor* has made provision for you to use them in the instructional units. You draw your graphic on hi-res page 1, save it, and then use the saved picture as you would a graphic from a picture file diskette.

Ease Of Use

As I pointed out earlier, *Mentor* is an *extremely* user-friendly program. The author, Peter E. Holden, has tried to anticipate every mistake an inexperienced user might make (except for two word fill-in questions). Invalid input is either not accepted, or causes an error message to be displayed telling you what may be wrong. *All* instructions are displayed on the screen so there is very little need to refer to the printed documentation. The lone exception to this is The Game Show program. There was not enough room on

Microcomputer Software
Division Skills

We don't give them the answer. We show them how to get it.

New Milton Bradley Educational Software.

At last: programs that really make your kids think.
Most software only offers your students drill and practice. That's why it fails your class.

But with new Milton Bradley programs, they don't just stumble into the answer . . . they understand how they got it.

Clean, clear graphics make the lessons easy to follow, and engaging special effects make the learning fun.

Easy to use for both you and your students.
Just slip in the diskette. Students follow simple instructions; they don't need tutoring to operate the program.

Programs progress through a range of skill levels. Each unit is organized by specific topics, to adapt easily to your lesson plans.

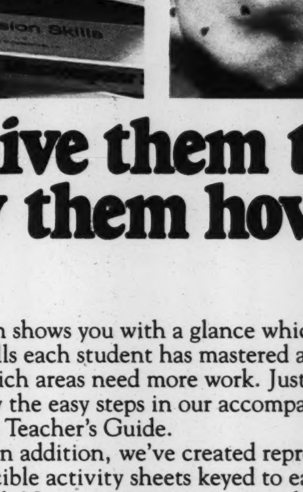
Track their progress in seconds.
Our streamlined management system shows you with a glance which skills each student has mastered and which areas need more work. Just follow the easy steps in our accompanying Teacher's Guide.

In addition, we've created reproducible activity sheets keyed to each skill. Now you can give more individual help to each student—on or off the computer.

Only $44.95. For your Apple II computer.
Each unit, sold separately, costs only $44.95. It's designed for Apple II microcomputers in 6th, 7th, and 8th grade classrooms (required 48KRAM, in Applesoft® BASIC).

With Milton Bradley, your best students will be challenged. Your underachievers will get the help they need. And you'll have more time to do what you do best: teach.

For more information . . . Phone: 413-525-6411, ext. 2618, or write: Milton Bradley, 443 Shaker Rd., East Longmeadow, MA 01028. We'll send you our free brochure. Or contact your local microcomputer software dealer for a demonstration. Take advantage of learning tools that get honors in all subjects.



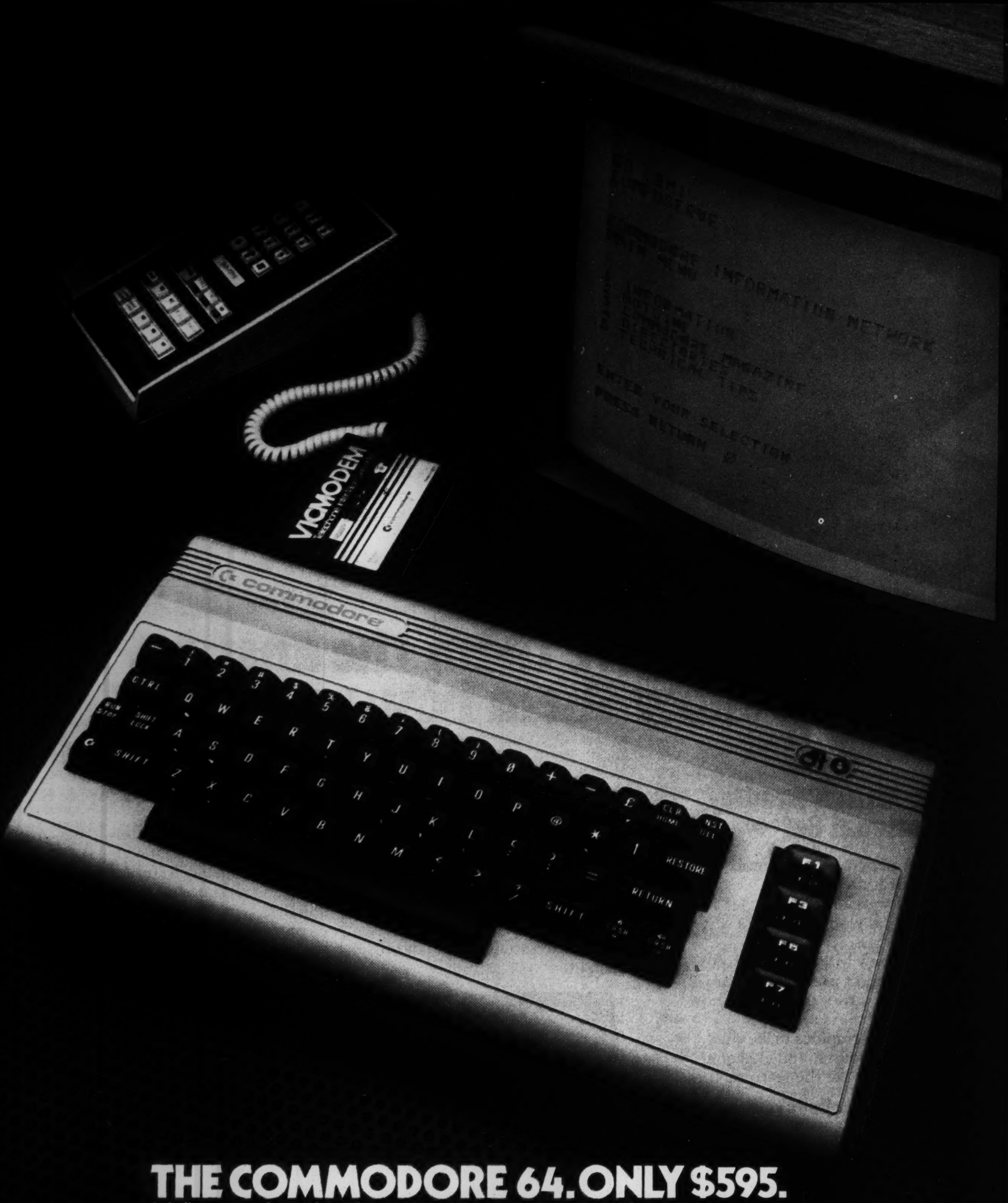
Choose from seven units: **Division Skills; Mixed Numbers; Decimal Skills; Vocabulary Skills:** Prefixes, Suffixes, Root Words; **Vocabulary Skills:** Context Clues; **Punctuation Skills:** Commas; **Punctuation Skills:** Endmarks, Semicolon, Colon.

New. Coming January, 1983:
Ratio and Proportion
Percent
Building Better Sentences
Reading Comprehension

Milton Bradley Educational Software.
It's First Class.

MB
Key to Learning ®

CIRCLE 218 ON READER SERVICE CARD


VICMODEM
commodore
64
MAIN MENU INFORMATION NETWORK
ENTER YOUR SELECTION
PRESS RETURN

THE COMMODORE 64. ONLY $595.

What nobody else can give you at twice the price.

"THE COMMODORE 64 COULD BE THE MICROCOMPUTER INDUSTRY'S OUTSTANDING NEW PRODUCT INTRODUCTION SINCE THE BIRTH OF THIS INDUSTRY."

–SHEARSON/AMERICAN EXPRESS

They're speaking to a group as interested as anyone else in the future of computers: the people who buy stock in the companies that make computers.

If, on the other hand, you're a person whose livelihood depends on a personal computer—or whose leisure time revolves around one—what follows should impress you even more than it impresses investors.

MIGHT MAKES RIGHT.

The value of a computer is determined by what it can do. What it can do is largely determined by its memory.

The Commodore 64's basic RAM is 64K. This amount of power is unusual enough in a micro at any price.

At $595, it is astonishing.

Compared with the Apple II+®, for instance, the Commodore 64™ offers 33% more power at considerably less than 50% of the cost.

Compared with anything else, it's even more impressive.

PILE ON THE PERIPHERALS.

Because the basic cost of the 64 is so low, you can afford to buy more peripherals for it. Like disk drives, printers, and a telephone modem that's priced at around $100.

This means you can own the 64, disk drive, printer and modem for a little more than an Apple II+ computer alone.

HARD FACTS ABOUT SOFTWARE.

The Commodore 64 will have a broad range of custom software packages including an electronic spreadsheet; business graphics (including printout); a user-definable diary/calendar; word processing; mailing lists, and more.

With BASIC as its primary language, it is also PET BASIC compatible.

The Commodore 64 will also be programmable in USCD PASCAL, PILOT and LOGO.

And, with the added CP/M® option, you will have access to hundreds of exciting software packages.

THE FUN SIDE OF POWER.

The Commodore 64 can become very playful at a moment's notice.

You can use Commodore's plug-in game cartridges or invent your own diversions. All will be enhanced by brilliant video quality (320 x 200 pixels, 16 available colors, 3D Sprite graphics), plus outstanding sound.

The 64's built-in music synthesizer has a programmable ADSR (attack, decay, sustain, release) envelope, 3 voices (each with a 9-octave range) and 4 waveforms. All of which you can hear through your audio system and see in full color as you compose or play back.

NOW'S YOUR CHANCE.

If you've been waiting for the "computer revolution," consider it as having arrived.

Through its 25 years of existence, Commodore has been committed to delivering better products at lower prices.

Today, the company's vertical integration has resulted in the Commodore 64's price performance breakthrough heralded by Shearson/American Express.

Visit a Commodore Computer dealer and discover the 64 soon.

It will expand your mind without deflating your wallet.

CP/M® is a registered trademark of Digital Research, Inc.

Commodore Business Machines/Personal Systems Division
P.O. Box 500 Conshohocken, Pennsylvania 19428

Please send me more information on the Commodore 64.
Name____________________
Address____________________
City__________ State__________ Zip__________
Phone____________________

commodore
COMPUTER

CC-O

CIRCLE 133 ON READER SERVICE CARD

Figure 3. Subject Content of Picture File Diskettes.

Geology
Glaciers
River Maturation
Rock Cycle
Water Cycle
Earth's Cross-Section
Volcanoes
Earthquakes
Tectonic Plates
Tectonic Plate Cross-Section
Island Chain Cross-Section
Mountain Types
Relative Age
Igneous Intrusions
Types of Wells

Space Science
Refracting/Reflecting Telescopes
Electromagnetic Spectrum
Stellar Evolution
H-R Diagram
Solar System
Distance by Parallax
Tides
Comets
Phases of the Moon
Eclipses
Rotation (time of day)
Earth Orbit (angle of axis, seasons)
Angle of Incidence

Oceanography
Winds and Currents
Surface Currents
Echo Sounding
Ocean Floor Features
Salinity Changes
Density Currents (Mediterranean)
Deep Bottom Currents
Waves
Breakers

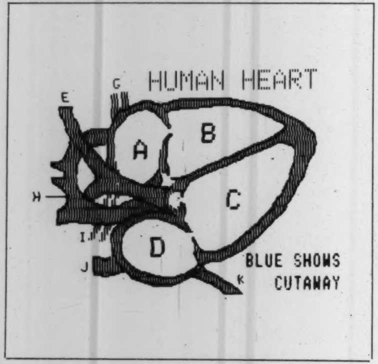
Meteorology
Humidity Graph
Temperature Layer Graph
Cloud Formation Over Mountains
Weather Map
Isobar Map
Air Mass Source Regions
Fronts
Low Pressure Air Mass Development
Change of State
Radiation Balance
Convection Winds
Convection Cells
Global Wind Belts

Human Anatomy
Heart
Brain
Eye
Ear
Respiratory System
Kidney
Endocrine System
Neuron
Circulatory System Schematic
Digestive System

Plant Anatomy
Roots (microsection)
Stem Cross-Section
Leaf Cross-Section
Photosynthesis
Flowers
Seeds
Germination

Cells/Genetics
Animal Cell
Plant Cell
Mitosis
Meiosis
Punnett Square
Sex Linked Traits
DNA
Protozoa
Energy Reactions
Pedigree

Figure 4.



the single disk for The Game Show instructions, so they are on a separate printed sheet. Mr. Holden has thoughtfully provided extra copies of these instructions. However, this illustrates my point about student-friendliness versus teacher-friendliness.

Documentation

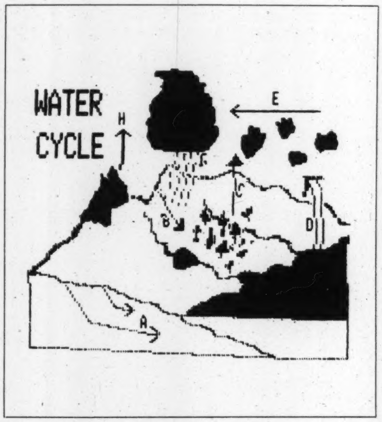
Mentor needs little documentation. However, it is there. The teacher's manual begins with the assumption that the teacher knows little more than how to turn the computer on. In a conversational tone, it explains the basics of the program and leads the reader through the creation of a sample instructional unit. It does not repeat the instructions found on the disk, but rather expands and explains them.

Included as part of the documentation is a print-out of the instruction sets found on the disk. This is convenient, as it is sometimes possible to forget where you are, and then discover that the instructions have disappeared from the screen. It is also a good way to get an overview of the way in which the program parts mesh.

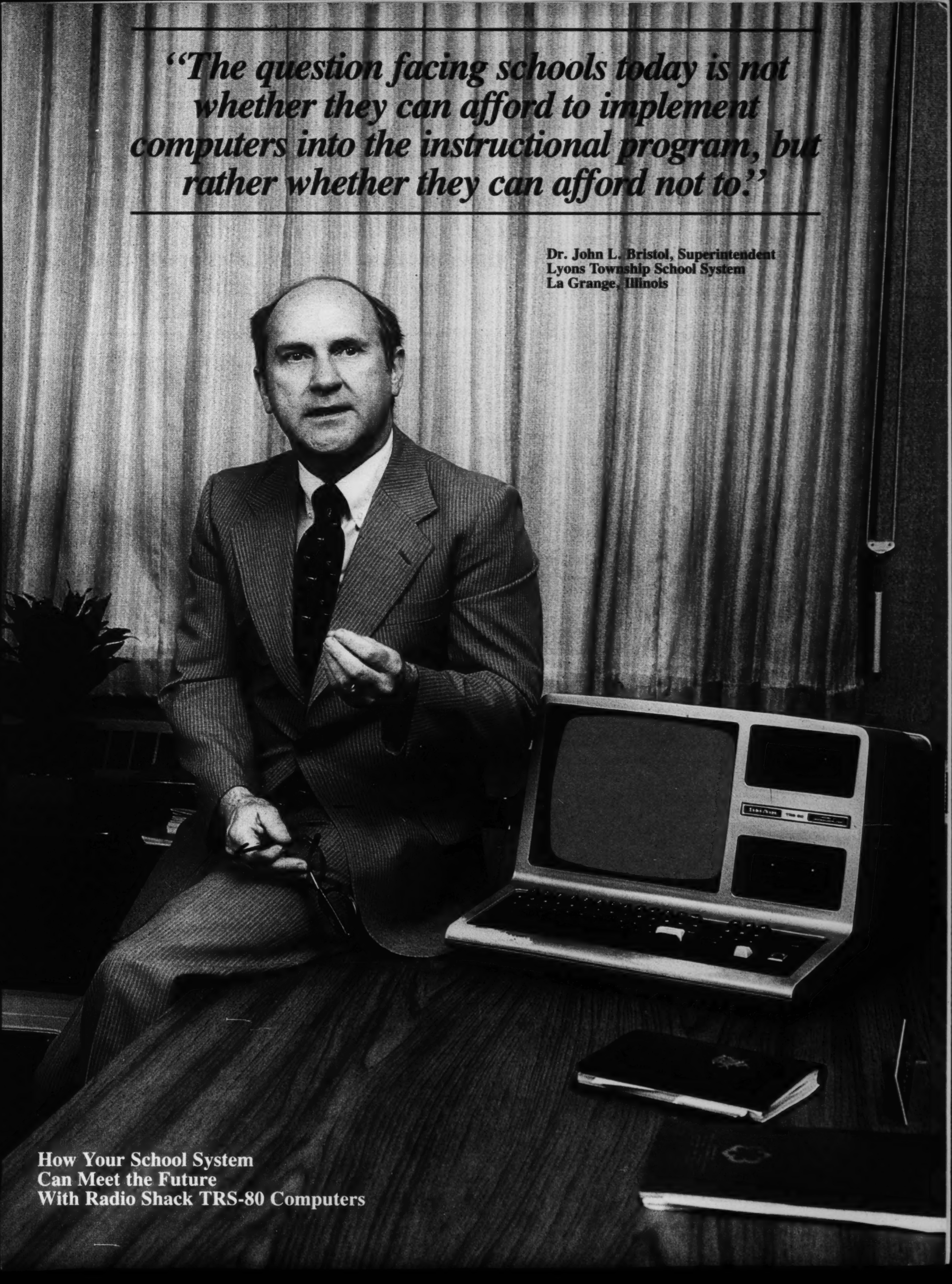
Summary

In all, *Mentor* is a good program, and a good dollar value. It is not a perfect program, but few are. Mr. Holden is to be thanked for providing a program that recognizes current thinking of the educational community, and one which attempts to ease the passage of computers into the classroom. This is a *good* program. With just a few minor changes, it would be an excellent one. ☐

Figure 5.



CIRCLE 253 ON READER SERVICE CARD→



> *"The question facing schools today is not whether they can afford to implement computers into the instructional program, but rather whether they can afford not to."*

Dr. John L. Bristol, Superintendent
Lyons Township School System
La Grange, Illinois

How Your School System Can Meet the Future With Radio Shack TRS-80 Computers

LA GRANGE, Ill. — The man behind one of the most successful computer-education programs in the nation has said flatly that schools must face the growing need for both computer-assisted instruction (CAI) and computer literacy as an educational fundamental.

Speaking before a meeting of the Midwest Suburban Superintendents Association, Dr. John L. Bristol, Superintendent of the Lyons Township School System in La Grange, also said, "Computers so pervade our society — they're in homes, cars, industry — that knowing how to use them is as important as knowing how to read and write."

Indeed, such important groups as the President's Science Advisory Committee have urged that all high school students be taught about computers.

But the question that most people — educators and taxpayers alike — wonder about is how can a district reach a computer-education goal without breaking an already overstrained budget.

If you ask Dr. Bristol, he will describe how the Lyons District has achieved 100 per cent computer literacy in its faculty and high school student body in the course of just two years with an investment, on a per student basis, of less than the average textbook.

How did they do it?

"We committed ourselves," Dr. Bristol explains, "first to defining the role of computers in the education of all students and then to developing and implementing a plan in a rapid systematic manner."

"All" is the key word here.

According to Dr. Bristol, the first two principles that their plan was to be based on were that all 3900 La Grange highschool students — not just gifted or math-oriented ones — were to learn to use computers, and that all teachers would, too.

> ***"We committed ourselves . . . to defining the role of computers in the education of all students and then to developing and implementing a plan . . ."***

Dr. Bristol sees several advantages to following a pattern like that used in La Grange.

"The first priority is computer literacy on the part of all students. That requires that they all be taking courses that involve computers. They shouldn't be forced to make a choice between Physics 1 and Computers 1 in order to gain a basic knowledge of computers."

"But it also requires that there be situations where there is one computer for each student in a laboratory taught by someone who is already computer literate."

"What is more logical than having teachers bring their classes to the lab periodically and teach them using the computers? The computer is then an integral part of all existing programs . . . not something for others or to be done by others."

"The cost per student was well below that of the average textbook..."

"The students gain two ways: they learn about the subject and they learn about computers."

"And we gain as well. We do a better job preparing them for the computerized future. And we improve our teaching by making use of an aid that students always find interesting."

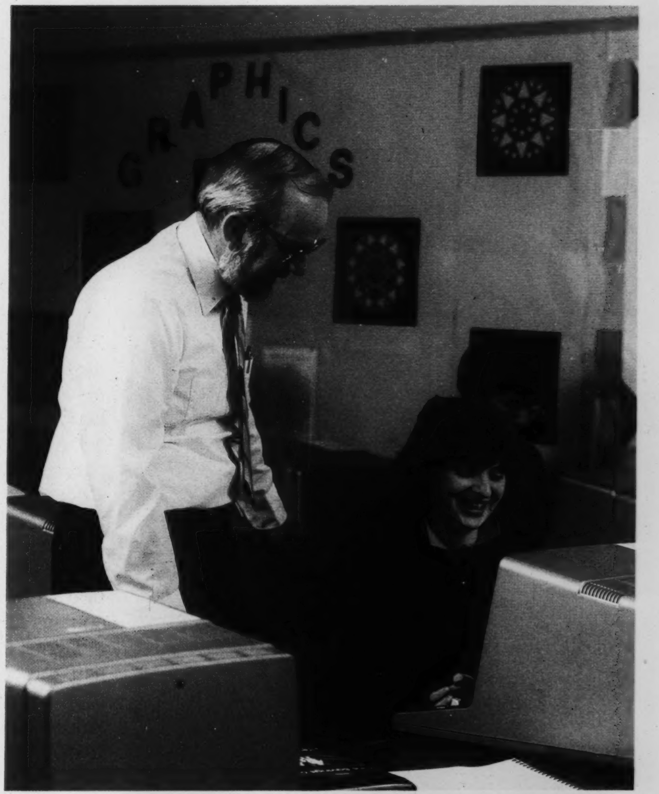
Nevertheless, the cost of setting up a program like that found in La Grange was surprisingly low when viewed on a cost-per-student basis.

As Dr. Bristol says, the Lyons district instituted computer-assisted instruction in a big way—it is currently using over 250 TRS-80 computers. This insured not only that all La Grange students both can and will take advantage of the computers, but that the district can show an excellent cost-per-pupil ratio.

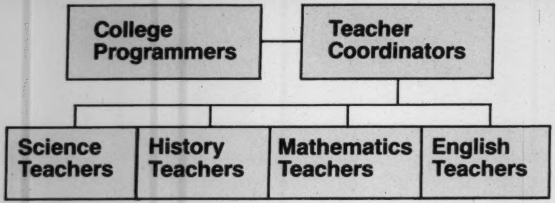
Assuming a cost extension of five years and use by approximately 8,000 students per year, the cost per student is $4.78 for the hardware and $2.25 for the programs, or a total of a little more than $7.00.

As Dr. Bristol notes, this figure is "well below that of the average textbook or library book." Yet not a single extra staff person was added to implement the program.

"The cost is a pretty small portion of the average district's $1600 annual per pupil expenditures," Dr. Bristol concludes. "Yet it may yield more in . . . preparing youth for tomorrow than 10 other ways those dollars might be spent."



"The students gain two ways: they learn about the subject and they learn about computers. And we do a better job preparing them for the . . . future."



At La Grange, it was the teachers themselves who decided what courseware was needed. Their requirements were then translated by teacher coordinators to programming students of a nearby college.

Having established these principles, Dr. Bristol says, the district proceeded to implement its plan: select hardware, give all the faculty literacy instruction, let the staff determine appropriate applications for instruction, and develop programs to meet those applications.

To make the hardware selection, they first established their selection criteria, then invited suppliers to make presentations.

The criteria were ''sophistication, easy repair, ability to upgrade, dependability, networking capability and flexibility in use.''

After surveying the available offerings, the district picked the Radio Shack TRS-80 Model III in two forms, 2-disk 48K ''teacher's computers'' and 16K ''student computers,'' connected by a Radio Shack network system.

''Teachers are the implementors of curriculum changes, but how could they design ways to use computers in their courses . . . when they themselves were educated in a noncomputerized era?''

One teacher's computer and 26 student computers, plus a printer, were purchased for each of eight high school computer labs.

The next stage was to gain computer literacy, the ability to use computers with pre-developed programs, among the faculty. In La Grange, eight teachers, who had previously been instructed by outside experts, taught the rest of the district faculty during special summer training sessions.

The Lyons district felt that 100 per cent literacy among teachers was essential for proper use of the computers, and Dr. Bristol feels this conclusion has been proved correct.

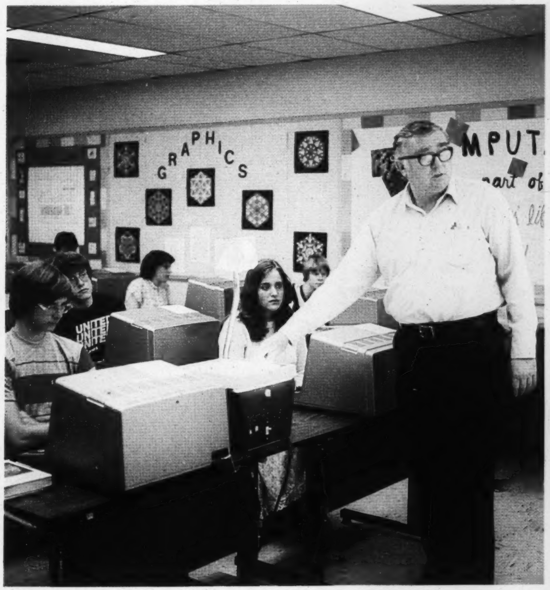
"Teachers are the implementors of curriculum changes," he says, "but how could they design ways to use computers in their courses, and regularly give students 'hands-on' experience in 'course-specific' computer drills and programming, when they themselves were educated in a non-computerized era?"

However, once the faculty had attained a basic familiarity with computers, Dr. Bristol says, they were ready to begin making specific suggestions for how the computers could be used in courses they were familiar with.

From the expected math programs and spelling drills to the unexpected courses like health, music and home economics, La Grange teachers proposed ways they saw for the computers to help their students learn.

A home economics proposal described how students could use the computers to help pick the proper textiles for clothing projects.

"We had those who would implement the programs working on them, giving them a sense of both participation and control."



In a health course, a student would be able to find out the effect of alcohol abuse on various parts of the body — or how many calories are allowed to maintain an ideal weight.

Music teachers worked up an idea whereby computers could help teach basic chords and fingerings for a beginning guitar course.

All these, and many others, have since been put in the curriculum, balanced out among the various departments so that at least 50 per cent of the students at the two high schools will be taking computer-assisted courses at any time.

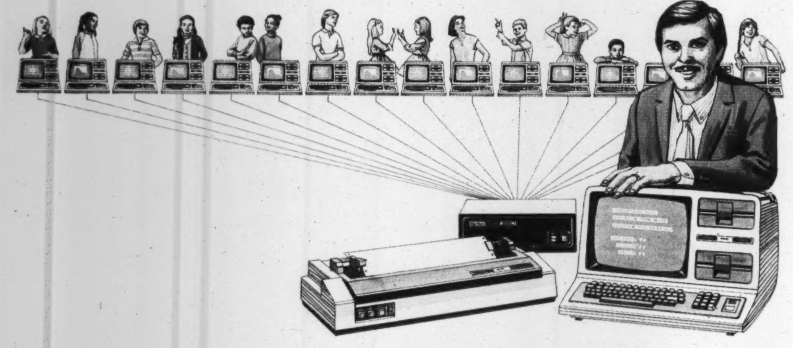
Lyons accomplished this by setting up teams to evaluate the proposals and then to work with college student programmers and "teacher coordinators" from within the faculty in developing them.

In using programmers to write the software, but not to run the system, Dr. Bristol says, the district accomplished two things.

"We got programs that were designed specifically to meet the needs of our students and curriculum. And we had those who would implement the programs working on them, giving them a sense of both participation and control."

"The first priority is computer literacy on the part of all students. That requires that they all be taking courses that involve computers. They shouldn't be forced to make a choice between physics and computers . . ."

Radio Shack's State-of-the-Art Classroom Computer Networks Mean Greater Instructional Usefulness at a Lower Cost to You



The New Network 3 Controller and Operating Software Allows Low-Cost TRS-80 Model III Microcomputers To Access Programs Simultaneously!

FORT WORTH, Tex.—Radio Shack's versatile, yet easy-to-use Network 3 Controller System is quickly becoming one of the most popular systems in educational computing because it allows up to sixteen non-disk Model III student stations to access a single teacher's "host" station.

Each student can thus choose from lessons that are stored on disk in the host, freeing teachers from the burden of loading one lesson after another into individual stations, and giving them more time to spend with students who need extra help.

As lessons with student record keeping are completed, scores are automatically stored on the host disk for later review.

Students also like the Network 3 because it allows them to send work off to be printed without waiting, and to continue with new projects immediately.

Computer science classes find it especially helpful since they can access most of the features of Disk BASIC using non-disk student stations.

Administrators and school boards love the Network 3 because it's so cost-effective. Just one disk-based Model III is needed for every 16 non-disk units. It's like having a disk-based computer at every desk.

As school districts like La Grange, Illinois, Rosemount, Minnesota, and hundreds of others across the country have discovered, a TRS-80 Model III Network makes sense—and saves dollars.

TRS-80 Courseware Can Help You "Computerize" Your School System

FORT WORTH, Tex.—In addition to providing the most cost-effective equipment available, Radio Shack smooths the transition to CAI (computer-assisted instruction) by providing a large selection of instructionally sound and properly validated educational materials.

Relying on outstanding teachers, administrators and curriculum specialists for expert advice, Radio Shack has designed and field-tested courseware packages on mathematics, programming, reading, history—plus aids for teacher-designed courses.

For more information, and the name of the full-time Educational Coordinator in your area, call Radio Shack's Education Division at 800-433-5682 toll free. In Texas, call 800-772-8538.

Radio Shack K-8 Math Program
Radio Shack Essential Math Program
AlphaKey
PART 1:
PART 2:
PART 3:

Radio Shack®

The biggest name in little computers™

A DIVISION OF TANDY CORPORATION

The Friendly Computer Languages

Jim Muller

They're everywhere these days: in homes, offices, laboratories, cars, industrial controls, kitchen appliances, radios and TV sets, security systems, and children's toys. "They" are, of course, the ubiquitous microcomputer, the millions of single chip devices controlling a host of consumer products, the board-level systems controlling industrial processes, and, of course, the desktop computer through which a rapidly increasing number of laypeople are becoming involved in the microcomputer revolution.

To some, this proliferation of computer technology heralds an exciting new revolution. To others, it is simply revolting.

Recently, however, that negative opinion has begun to change, as new user-friendly languages are introduced for personal computers. No longer does the newcomer to the world of computers have to cope with such alien words as INIT, CHR$, GOSUB, STR$, REM, and DIM. A rapidly growing number of young people and the young-at-heart are entering the world of microcomputers riding on the back of a turtle.

Not long ago, the turtle was an electromechanical pet that roamed the floor, controlled by a sizable computer and a simple child-oriented keyboard. Youngsters could manipulate the turtle through the keyboard to make it draw pictures on large sheets of paper. The turtle had a unique pen that it could raise or lower to draw figures.

In drawing pictures of houses, animals, or just geometric shapes, youngsters gained valuable experience in logical thought and problem-solving. Each task had to be broken down into the simplest steps, and then assembled in a structured procedure to accomplish that task. If the drawing was not correct, they went back and refined the procedure until it was drawn the way they wanted.

Now the turtle resides on the computer display screen in the shape of a small triangle. But it will still draw pictures, responding to simple commands to go FORWARD, BACK, LEFT, or RIGHT. These turtle graphics commands were first introduced to microcomputers through the Logo language, but are now being incorporated into an increasing number of languages and personal computers.

Just as you select a car to suit your own personal tastes, so you should select a turtle graphics language.

Last summer, while watching a group of youngsters manipulate the cybernetic turtle around the screen to create some dazzling graphics, it struck me that these young people needed a place in which they could fully explore the world of microcomputers and microelectronic technology. They needed their own organization through which they could come to know what different computers could do, what languages such as Logo, Pilot, Basic and Pascal were all about. They not only needed the chance to explore the computer, they needed the challenge to excel. From this, the Young Peoples' Logo Association has evolved with a membership of Turtles that span all 50 states, and a growing number of foreign countries.

At first the choices were easy. Throughout 1981, Logo was available only on the TI 99/4 computer. And, through turtle graphics and the sprite mode our young Turtles were soon developing procedures to accomplish all sorts of colorful things. We occasionally used Big Trak, the programmable truck from Milton Bradley, to help demonstrate the Turtle commands of FORWARD, RIGHT, LEFT, and REPEAT to show how a picture had to be broken down into each step the turtle was to take.

By programming Big Trak to go around the Ping Pong table and under the bench, and to fire its phaser at the dog, for example, youngsters were able to visualize the steps needed to guide the Turtles around the screen to accomplish complex geometric tasks.

Atari Pilot

Then came Atari Pilot with turtle graphics, followed quickly by two versions

```
T: "Please enter a distance."   T(ype): "Please enter a distance."
A: #A                           A(ccept): #A (#A is a variable)
GR: *HERE                       GR(aphics): *HERE (Sets up the Label,
                                "HERE."
GR: PEN RED                     Tells the pen to draw in red "ink."
GR: 4(DRAW #A; TURN 90)         GR(aphics): 4(DRAW #A; TURN 90) Repeat
                                the operations within the brackets four
                                times---the turtle will draw a red
                                line #A units long and then turn right
                                90°, putting a red box on the screen.
C: #A = #A + 2                  C(ompute): The value of #A = The value
                                of #A plus 2.
J: *HERE                        J(ump to): *HERE, or to the Label, "
                                HERE," and repeat the process.
```

Figure 1.

Jim Muller, President, Young Peoples' LOGO Association, Richardson, TX 75081.

← CIRCLE 253 ON READER SERVICE CARD

of MIT Logo for the Apple II, and then Apple Logo. Turtle graphics is also available through other languages and systems in one form or another. Of course, Big Trak has been available for a few years, offering a rudimentary introduction to turtle graphics. This makes it increasingly difficult to recommend what parents and teachers should buy for their own Turtles.

Just as you select a car to suit your own personal tastes, so you should select a turtle graphics language. For example, for the novice driver, the simpler, economy model may be the best vehicle. For under $500, an Atari 400 computer and a colorful, easy-to-use language, Atari Pilot with turtle graphics, is made readily available to youngsters from primary grades up.

In addition to offering enjoyable turtle graphics features and advantages, Atari Pilot offers the unique feature of an easy transition to Basic and other common microcomputer languages. For example, it shares some common format and editing features with Basic.

Pilot, for Programmed Inquiry, Learning, Or Teaching, is a very conversational language which uses simple line abbreviations to prescribe the function of that line. It was developed initially as an easy-to-use authoring system for educators, and Atari has added turtle graphics features to the language to make it more user-friendly. (See Figure 1.)

If I choose to retain this short program for drawing a box, I can do so by simply entering the command AUTO followed by the label *BOX and the program. To mark the end of the program, enter E: When listed, the program would look like this:

```
10 *BOX
20 T: PLEASE ENTER DISTANCE.
30 A: #A
40 *HERE
50 GR: PEN RED
60 GR: 4(DRAW #A; TURN 90)
70 C: #A = #A + 2
80 J: *HERE
90 E:
```

The program is run by first clearing the screen to set up the graphics mode with GR:CLEAR. Then the Use command is entered "U: *BOX. An endless series of red boxes will be drawn on the screen. However, that can be limited by simply changing line 80 to read:

J(#A 45): *HERE

Now, boxes will be drawn until the dimension of a side equals 5.

Boxes and other figures can be placed at any coordinates on the screen. The turtle can draw in yellow and blue, as well as red. There is also a command to FILL a box or a house, so you can make a city of little boxes or colorful skyscrapers.

The language offers sound effects and assembly language access to add some truly spectacular effects. It is also recursive in that commands such as *BOX can be used in other procedures. It also offers some very interesting text manipulation capabilities for easy lesson programming, as well for developing word games.

The greatest asset of the language is spectacular documentation that is heavily illustrated, thorough, and very easy to understand. Also included are two well-done demonstration tapes that orient the user to the capabilities of the language.

However, Atari Pilot has some distinct limitations when compared to the various implementations of Logo. The language is much smaller in size and in scope. But, when it comes to the practical real-world situation of economically providing youngsters with the opportunity to explore the fun and excitement of personal computing, Atari Pilot is an excellent choice and an excellent introduction to the Atari computers. The books that accompany the language do as much to make the computer user-friendly as does the language itself.

The sprite mode is especially useful for elementary grade youngsters.

Three Versions

There are currently three versions of Logo available through four companies: TI Logo from Texas Instruments, MIT Logo for the Apple computer from Terrapin, Inc. and Krell Software Inc., and Apple Logo developed by Logo Computer Systems, Inc. of Canada, and distributed by Apple Computer Inc.

TI Logo requires the basic TI 99/4A console plus Extended Memory and the TI Logo command module. The suggested retail price for the minimum system is just under $1000. The versions of Logo for the Apple II computer require at least one disk drive, extension of the basic memory to 64K, and the language, bringing the suggested retail price for the complete system to around $2400. The language alone is available from Terrapin, Inc. at $149.95 and from Krell Software for $179.95. The Krell version includes an extra demonstration disk called "Alice in Logoland," which takes the user through examples of virtually all of the capabilities of the language. Apple Logo is available for $175 and comes with two excellent, heavily-illustrated books. In terms of documentation, Apple Logo and Atari Pilot are the two very clear-cut standouts.

All of the versions of Logo offer a turtle graphics mode which moves the turtle around the screen to draw geometric shapes and patterns. The Apple versions each offer five pen and background colors whereas TI Logo offers sixteen colors. In the MIT versions of Logo, the shape of the turtle may be redefined and moved around the screen to create animated procedures. TI Logo, however, offers 32 Sprites which may carry or look like 27 shapes. These shapes may be any of five predefined shapes in the language, or they may be defined by the user. The shapes will not, however, draw lines.

Sprites

The sprite mode is especially useful for elementary grade youngsters in that it provides a very colorful means for them to become actively involved with the computer right away. It also provides the means for demonstrating what might otherwise be incomprehensible mathematical concepts.

For example, it is extremely difficult to explain the numerical concept of "zero" to young children. They have no knowledge of what "nothing" is. However, this abstraction becomes very real when they TELL :ALL (of the sprites to) CARRY O. Those sprites that are on the screen will then disappear.

There is, however, an inconsistency in TI Logo that can be quite confusing to young programmers. In the Turtle Mode, it is possible to SETCOLOR [6 15] and have the Turtle draw a red line on a white background. However, in the Sprite Mode, the computer will not accept this as an input. Only the pencolor can be specified with the SETCOLOR command.

A graphics board that provides animation capabilities for Apple Logo was demonstrated at the West Coast Computer Faire in March. This board allows 32 turtles to assume shapes designed into the language or by the user, allows for the use of 16 colors, and sets the turtles in motion with or without the pen drawing a line.

A valuable feature of the versions of Logo for the Apple Computer is the ability to select full screen or partial screen graphics. This can be done even while a procedure is in process. In the Turtle Mode, TI Logo reserves the bottom portion of the screen for text. In the Sprite Mode, the full screen is used with text written from the top of the screen.

NEW from MUSE Software

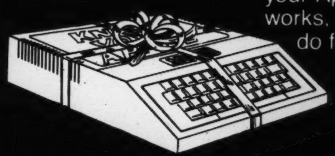
INTRODUCING

The Sensational Program

KNOW YOUR APPLE™

KNOW
YOUR
APPLE
MUSE
apple][
disk II
Instant Pleasure!
Delight Your Friends!
Educational Fun!
Gift Packaged!

1. **Instant Pleasure:** Set up your Apple®, turn on the program, and enjoy your computer instantly!
2. **Amaze and Delight your Friends:** Whether you're a new or long-time Apple owner, you can astonish your friends by letting them sit right down and enjoy your Apple, too!
3. **Educational:** Gain instant knowledge about your Apple . . . how it works, and what it can do for you!



4. **Gift Packaged:** An excellent gift for any Apple owner; for personal gifts, birthdays, and Christmas giving.
5. **Collector's Item:** The box is a unique miniature replica of the Apple computer at no extra charge.

Everyone should have a "Know Your Apple"! "Without one, you'll be a 'byte' away from total Apple pleasure!"

PRICE: $34.95

Available now from dealers and distributors nationwide or from Muse Software

For Apple II with 48K and disk drive

Apple is a registered trademark of Apple Computer, Inc.

MUSE™
SOFTWARE

One Step Ahead

347 North Charles Street • Baltimore, Md. 21201 • 301-659-7212

CIRCLE 221 ON READER SERVICE CARD

The Official

FROGGER™

by SEGA®

APPLE VERSION BY
OLAF LUBECK
ATARI VERSION BY
JOHN HARRIS

FROGGER runs on any 48K APPLE II with DOS 3.3 or ATARI 400/800 with 32K and a Diskdrive, 16K and cassette. Frogger is available for $34.95 at your local computer store or order directly from . . .

All orders by VISA, Mastercard, check, or COD. Add one dollar for shipping. California residents please include 6% sales tax.

Sierra
ON-LINE INC
36575 MUDGE RANCH ROAD COARSEGOLD CA 93614
TLX 9103629025 209 683 6858
CIRCLE 231 ON READER SERVICE CARD

® and TM designate trademarks of Sega Enterprises, Inc.

© 1981 Sega Enterprises, Inc.

Apple Logo allows the user to select the option of having the Turtle "wrap" or not. Simple commands direct the turtle to reverse direction when it comes to the edge of the screen, or simply to disappear off the screen. In TI Logo, the turtle and the sprite always wrap around.

Logo for the Apple offers considerably more flexibility in both graphic and arithmetic operations through the use of floating point math. This allows for trigonometric, logical, square roots, and other math functions not possible through the TI integer-only system. In addition to the numerical flexibility, the Apple versions of Logo offer more graphic flexibility.

For example, consider the following simple procedure:

```
TO SPIRAL :DISTANCE :ANGLE
FORWARD :DISTANCE
RIGHT: ANGLE
MAKE "D :D + 1
SPIRAL :DISTANCE :ANGLE
END
```

Running this simple procedure on the Apple computer will result in the drawing of an ever-increasing spiral. By entering SPIRAL 1 144, a star will be drawn that will increase in size each time it is drawn. The screen will eventually become totally white with only the turtle visible as it continues to draw. In TI Logo, however, the computer will signal OUT OF INK after about 25 repetitions of the procedure.

Apple versions of Logo provide interfacing to printers and other peripherals through assembly language access. The MIT versions of Logo for the Apple offer SAVEPICT and READPICT commands for saving and reading the contents of the screen into and from memory. The screen can also be printed out, a feature that is especially useful for showing screen graphics. Apple Logo does not offer these commands but they can be programmed. TI Logo offers no interfacing capability. Procedures can be printed on the TI Thermal Printer, and programs can be stored on tape or disk.

Logo and the Handicapped

Imagine the use of Logo by the physically handicapped wherein they have access to single-key commands that print out phrases and sentences. People with severe arthritis or other problems that limit their ability to type could still use the computer to communicate by entering a single key command.

For example:

```
TO G
CLEARSCREEN
 PRINTER
PRINT [YOUNG PEOPLES' LOGO ASSOCIATION]
PRINT [1208 HILLSDALE DRIVE]
PRINT [RICHARDSON, TEXAS 75081]
PRINT [ ]
PRINT [DEAR YPLA:]
END:
```

By simply typing the letter G and enter, the address of the YPLA and opening of the letter would be printed out on the printer. With a menu of useful phrases and sentences, the handicapped have a new means of communication readily available to them. And this list can be altered very easily to serve new requirements.

Another benefit of assembly language access through Apple versions of Logo is the ability to create new features in the language, such as music and sound effects. This also gives the user access to 16-color low-resolution graphics and the chance to alter the character set. TI Logo allows direct access to the character set by which youngsters have created their own alphabets and codes. There is no access to music or sound capability in this version, however.

The real power of Logo for the Apple computer becomes evident with the list processing capabilities offered by each.

The value of TI Logo is in its graphic capabilities and its user-friendliness for very young children. When the idea for the YPLA was being formulated last summer, junior high students and first graders used to get together around a few computers on a Ping-Pong table with the intent of duplicating their favorite arcade games through the computer or simply drawing colorful flowers. Not only did they all find the TI 99/4 exceptionally easy to use, they found that TI Logo offers very easy access to some exciting graphic and game programming capabilities.

We have had a variety of games developed including versions of lunar lander, flight control, crossing the asteroid belt, and similar exercises. Primary grade youngsters have developed some very interesting pictures, not to mention our first computerized Christmas card. The "human factors" designed into the language make it an excellent choice for elementary and junior high schools, and for those age groups at home. Unfortunately, the documentation that accompanies the language leaves a lot to be desired.

For example, a variety of undocumented commands have been found in TI Logo. FPUT, LPUT, THING, NUMBER?, WORD?, THING? are among these. The manual accompanying TI Logo was supposedly written for middle school age children, which makes it difficult to understand why the joystick commands, JOY1 and JOY2, were omitted.

Not only do these commands make the language competitive with several other child-oriented software packages, they offer some very interesting opportunities for using TI Logo with the handicapped. Each position of the joystick represents a different numerical input, and a simple rewiring or rebuilding of the joystick would offer the physically handicapped access to the computer.

Documentation

The documentation problems with TI Logo are reportedly being corrected, and a TI Logo Curriculum Guide is being published. In addition, several authors are preparing books on TI Logo for various age groups. Thus, this problem should disappear, hopefully as this article is being published.

The real power of Logo for the Apple computer becomes evident with the list processing capabilities offered by each. These capabilities tend to make these versions more complete computer languages. However, there are some differences worth noting. The MIT versions offer some editing and debugging commands which have to be programmed into Apple Logo. On the other hand, error handling in Apple Logo is generally more efficient in that error handling commands can be defined by the user.

The MIT versions of Logo for the Apple and the TI 99/4 were experimental developments. It would appear that Logo Computer Systems, Inc. learned from these experiments and has come up with a more complete language. Of course, it is reasonable to assume that all of the Logo developers are looking at improvements in the language. Thus, it will take more time to determine which version is going to become the "standard."

For the parent and teacher, there are, indeed, some tough choices. For the economy-minded, Atari Pilot is an excellent choice, the subcompact model that

MERRY BEE

ABC	Ages 5-6	$29.95
Word Games	8 to Adult	$24.95
Early Words	Ages 5-7	$19.95
Notes	Music Drill	$19.95

Each disk includes 3-12 separate programs.

For fun and educational too.
Full use of graphics and sound.
Apple II+ 48K. Specify 3.2 or 3.3.
Add $2.00 shipping per order.

MERRY BEE COMMUNICATIONS
815 CREST DRIVE
OMAHA, NE 68046
(402) 592-3479

Specializing in Apple software.
Consultants in interactive video.

Apple is a trademark of Apple Computer Co.

CIRCLE 201 ON READER SERVICE CARD

NEW **Kits Now Available**

NEWPORT "Pro-Sticks"
the Mercedes of Joysticks
'Creative Computing Magazine' Aug. 1982

Soft-Touch Controllers
for busy fingers and fast action

NEW Extension "Y" Adapters
with rapid fire action

Build your own custom video-game controls from our proven high quality arcade components.

Create your own control console right in your home. Send $3.00 for a brochure of creative and innovative ideas in custom video game joysticks and controllers. Includes easy to follow schematics and instructions for Atari, Apple, Pet Commodor, TSR-80, and other computers, and a complete kit and components price list.

INQUIRE ABOUT OUR CLUB DISCOUNTS

Please rush me ____ brochures at $3.00 each (includes First Class Mail and handling) and mail to:

Name ____________________

Address ____________________

City ____________ State ______ Zip ________

NEWPORT MACHINE DESIGN
P. O. Box 418, Bishop, CA 93514
(714) 873-5677

CIRCLE 227 ON READER SERVICE CARD

creative computing
BINDERS

Are your back issues of *Creative Computing* stacked in piles? In boxes? Does the one you want always seem to be missing? If so, you need our binders. Made of vinyl with the *Creative Computing* logo silk screened on front and spine. Each holds 12 issues with sturdy locking wire posts. Just $7.95 each. Or save by ordering 3 for $22.50, 6 for $42.95.

creative computing

CHARGE ORDERS PHONE 24 HOURS
TOLL FREE 800-631-8112
In N.J. only (201) 540-0445

creative computing Dept. C924, 39 E. Hanover Avenue, Morris Plains, NJ 07950

Please send me __________ *Creative Computing* Binders.

☐ PAYMENT ENCLOSED $__________ (NJ residents add 5% sales tax.)
Add $1.00 per order for postage and handling. Outside USA add $2.50 per unit ordered. Send U.S. funds only.

☐ CHARGE MY:
☐ American Express ☐ MasterCard ☐ Visa

Card Number ____________________ Exp. Date __________

Signature ____________________

Mr./Mrs./Ms. ____________________
(please print full name)

Address ____________________

City/State/Zip ____________________

Friendly Computer, continued...

offers excellent economy combined with efficient performance. This is not only because of the user-friendly benefits but because of its similarities to other more readily available programming languages. TI Logo is an expensive version of Logo, the intermediate model offering some unique benefits that will undoubtedly be improved and expanded in time. The TI computer is gaining rapidly in popularity and is being more actively supported by third parties, a good indication of the viability of the product.

The top-of-the-line resides within the Apple computer. To carry the analogy a step further, consider the version of Logo offered by Terrapin, Inc. as the solid, comfortable, efficient, four-door sedan. It is an excellent, long term investment backed by an experienced company. But would you teach a first time driver in a Mercedes or Cadillac El Dorado?

The Krell Software version appears to have more of a "luxury sports car" approach. It is a lean, dramatic package that offers comprehensive and colorful demonstration procedures. But in total, it is the model that requires some prior experience to use most efficiently.

Apple Logo is the Grand Touring model—solid, comfortable, dramatic, luxurious, well-documented, with outstanding performance. It stands out because of its thorough attention to detail.

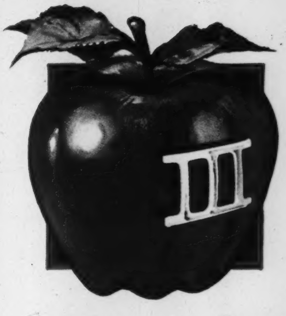
In our Turtle Learning Centers in Irving and Richardson, TX, we use them all. Each has its own followers and supporters. Each language has its own advantages. But, most important, there is something for everyone.

Many computer owners may find it hard to relate to that statement. This is why the analogy of languages to automobiles goes far beyond selection in a showroom. A few years ago, I was actively involved in promoting an employer's products to the road racing field. Race drivers, the hobbyists of the auto industry, were no more fiercely loyal to their favorite manufacturers than are computer owners.

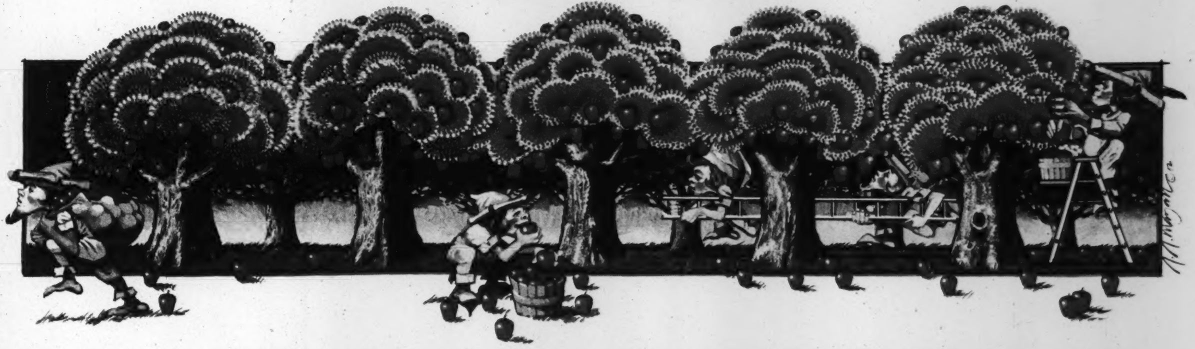
It is from the development work of the hobbyists that many consumer products have evolved—cars, radios, TV, hi-fi, stereo, and now the computer. Hopefully, the new friendly languages will be the development to make consumer products out of computers. ☐

MicRo Information Systems
a division of M-R Information Systems, Inc.
Presents Educational Software
designed to motivate the student.
(programs available for the TRS-80
Mod III* and VIC)**
Write for complete catalog, to:
M-R Information Systems, Inc.,
P.O. Box #73, Wayne, N.J., 07470
* TM Tandy, ** TM Commodore

CIRCLE 220 ON READER SERVICE CARD



Turn your Apple* III into an Orchard



With software from Quark™ Engineering

Quark Engineering brings you software specially designed for your Apple III. Easy-to-use products that dramatically increase your system's capabilities. And **your** productivity.

You start with Word Juggler™, the most easy-to-use word processor available for the Apple III. Word Juggler is written in assembly language. And comes with special keyboard templates to label important functions.

Word Juggler retails for $295. Form letter and simple mailing list capabilities are included free. If you want even more capacity, you can interface with Apple's Mail List Manager for an additional $35.

Need to check your spelling? Add Lexicheck™. A high-performance spelling checker with a 25,000-word dictionary. You can add your own words. And get more accurate documents, without a lot of proofreading. The price? Less than a penny a word. Only $195.

You can even send text from Word Juggler to computerized typesetting equipment. All you need is TypeFace™. Interface software which cuts your typesetting costs and eliminates re-keying errors. $175.

Finally, there's TranScribe™. A spooler designed especially for hard disk drives. TranScribe lets you use other computer functions while you're printing. And it's compatible with most Apple III software. $125.

There's much more to tell you about Word Juggler, Lexicheck, TypeFace and TranScribe. See them at your local dealer. Or contact us today. We'll help you turn your Apple III into an orchard. And from then on, you'll find easy picking.

Quark Engineering
1433 Williams, Suite 1102
Denver, CO 80218
(303) 399-1096

Quark

*Apple is a registered trademark of Apple Computer, Inc.

See us at Applefest/San Francisco, Booth 529.

CIRCLE 250 ON READER SERVICE CARD

We could tell you we make
We don't have to.

DUELING DIGITS
A HI-RES ACTION GAME BY BRIAN CLOUGH
David's Midnight Ma
Hi-Res Pinball by David Snider
TRACK ATTACK
LABYRINTH
A HI-RES ACTION GAME BY SCOTT SCHRAM
CHOPLIFTER!
A HI-RES ACTION GAME BY DAN GORLIN
Brøderbund Software
SERPENTINE
A HI-RES ARCADE STYLE GAME BY DAVID SNIDE
Brøderbund Software
STAR BLAZER
A Hi-Res Action Game by Tony Suzuki
Brøderbund Software

All for the Apple and Atari on diskette.

You keep Brøderbund at the top of the best seller lists, so you must know what it takes to make a great game. We think our APPLE and ATARI games are uniquely challenging with action and graphics second to none. But you keep asking for Brøderbund games because they're just plain fun.

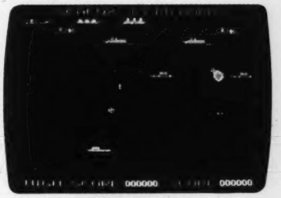
Enjoy the magic of our growing collection. Lead a daring rescue mission in CHOPLIFTER. Or survive the maze and monsters in slithery SERPENTINE and LABYRINTH. Blast through the future with STAR BLAZER or conquer the ultimate pinball game with DAVID'S MIDNIGHT MAGIC. Take up train robbing in TRACK ATTACK or tense your mind and reflexes in DUELING DIGITS.

Brøderbund

Brøderbund products are available at your retailer or by writing to:
Brøderbund Software, Inc., 1938 Fourth Street, San Rafael, CA 94901 • Tel: (415) 456-6424

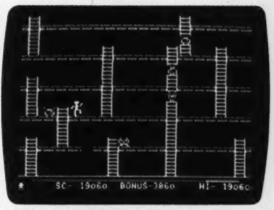
Apple II is a registered trademark of Apple Computer, Inc. Atari is a registered trademark of Atari, Inc.

the finest computer games.
You keep telling us.

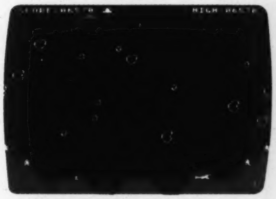


SEAFOX
Sub against the convoy
Apple & Atari disk

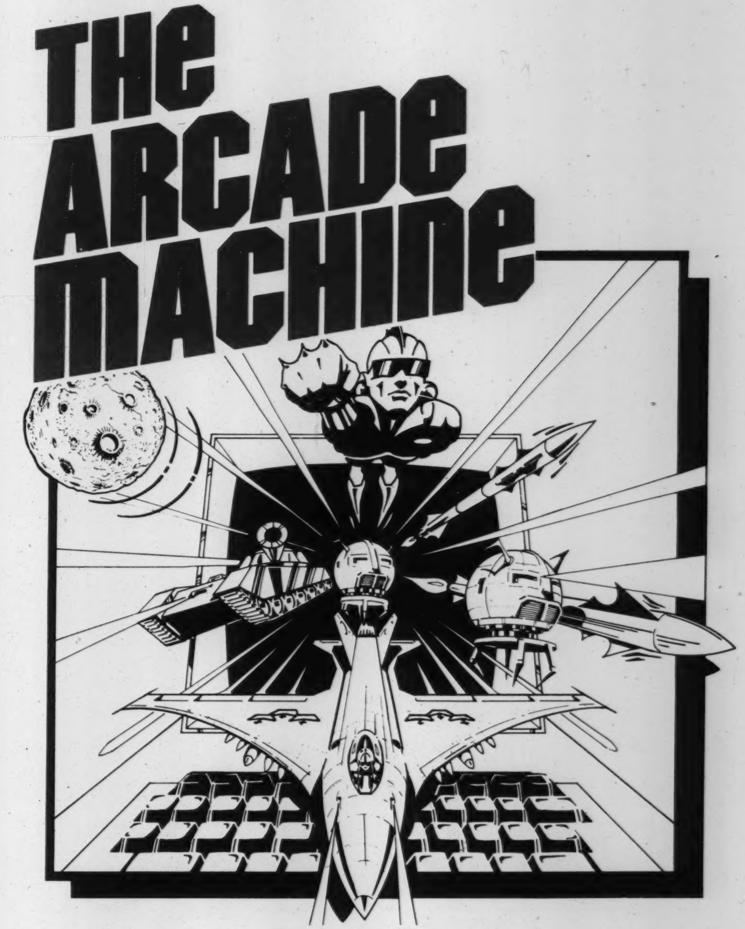
DEADLY SECRETS
Hi-res adventure
Apple disk



APPLE PANIC
The arcade classic
Apple disk, Atari cassette & disk



STELLAR SHUTTLE
Monsters and meteors
Atari cassette & disk



PUT US OUT OF BUSINESS! THE ARCADE MACHINE lets you design and produce your own computer games, without any programming knowledge! Send us your best game and enter the BRØDERBUND ARCADE MACHINE CONTEST. We'll be giving away thousands of dollars worth of hardware and software in prizes. If you have a creative touch and an artistic eye, you too can be an arcade designer. Write to Brøderbund for contest details or visit your participating retail store! (Available on Apple disk.)

Software

All Brøderbund games are fully guaranteed. If they ever fail to boot, return the original disk to Brøderbund for a free replacement. If you have physically damaged the disk please include five dollars for replacement.

CIRCLE 122 ON READER SERVICE CARD

Texas Instruments
color monitor
Texas Instruments
TI-99/4A

"TI's Home Computer. This is the one."

A lot of computers offer a lot. Only one in its price range offers the most. The TI Home Computer.

Better to begin with. Anyone can start right away with our Solid State Software™ Command Cartridges. Dozens of programs are available in home management, education and entertainment.

Easy to expand. Our Peripheral Expansion System gives you plug-in cards for memory expansion, P-Code capabilities, a disk drive controller and the RS232 Interface. You can also add a modem, speech synthesizer, disk drive and 80 column dot matrix printer.

Programming flexibility. TI BASIC is built into the Home Computer. But it can also handle TI Extended BASIC, UCSD Pascal* Version IV.0, TI LOGO II, TMS 9900 Assembly Language and TI PILOT. Programs can be stored in the optional Mini Memory Command Cartridge.

High-Tech specs. 16-bit microprocessor, 16K bytes RAM (expandable to 52K). 26K bytes internal ROM, up to 30K bytes external ROM. 3 simultaneous tones from 110 HZ to 40,000 HZ. High resolution video. U. & l.c. Single line overlay for 2nd function. Control & function keys. 16 color graphics with 4 modes & sprites.

Sound impressive? Compare a TI Home Computer with the competition and really be impressed. You won't even need a computer to tell you this is the one.

TEXAS INSTRUMENTS

© 1982 Texas Instruments

*UCSD Pascal is a trademark of the Regents of the University of California

CIRCLE 291 ON READER SERVICE CARD

creative computing software evaluation

A Maze Muncher for TI

Robert W. Cashman

creative computing

SOFTWARE PROFILE

Name: Munch Man
Type: Arcade game
System: TI-99/4 or TI-99/4A
Format: Command Module
Summary: Excellent
Price: $39.95
Manufacturer:
Texas Instruments Inc.
P.O. Box 53
Lubbock, TX 79408

Texas Instruments has developed a series of games for the 99/4 and 99/4A that rival those found in arcade centers. Their latest, *Munch Man*, is a perfect example. It is very similar although not identical, to Pac-Man, and the level of competition that *Munch Man* offers will give the seasoned player all he can handle.

The object of the game is to connect the passages of a maze with the continuous chain that your Munch Man leaves behind as a trail. For every link of the chain that is joined together, the player receives 10 points.

While you are trying to connect your chain together, however, four creatures called "Hoonos" are pursuing you. They are bent on gobbling you up before you can complete your mission. Each one has a different level of intelligence so you must be careful in out-maneuvering them.

What can you do to combat this onslaught of creatures? You can locate and eat one of four energizers situated in the corners of the maze. You can't miss these. They look just like the state of Texas. The energizers give you the strength to capture the Hoonos and imprison them in the center of the maze.

You receive 70 points for eating an energizer and 100 for the first Hoono that you catch. Every subsequent Hoono captured doubles the number of points received from the previous capture.

How long can you remain energized? Not long. After a short period of time, the maze begins to flash from blue to red while the captured Hoonos escape. This indicates that your strength is returning to normal.

A player starts each game with three Munch Men, and the game ends, of course, when all of them are eaten. Should a player complete the chain while he still has Munch Men left, the game continues with an empty maze, four more energizers and four different Hoonos.

Munch Man can be played from the keyboard or with joysticks. Use the joysticks. They respond faster, and you will obtain much higher scores.

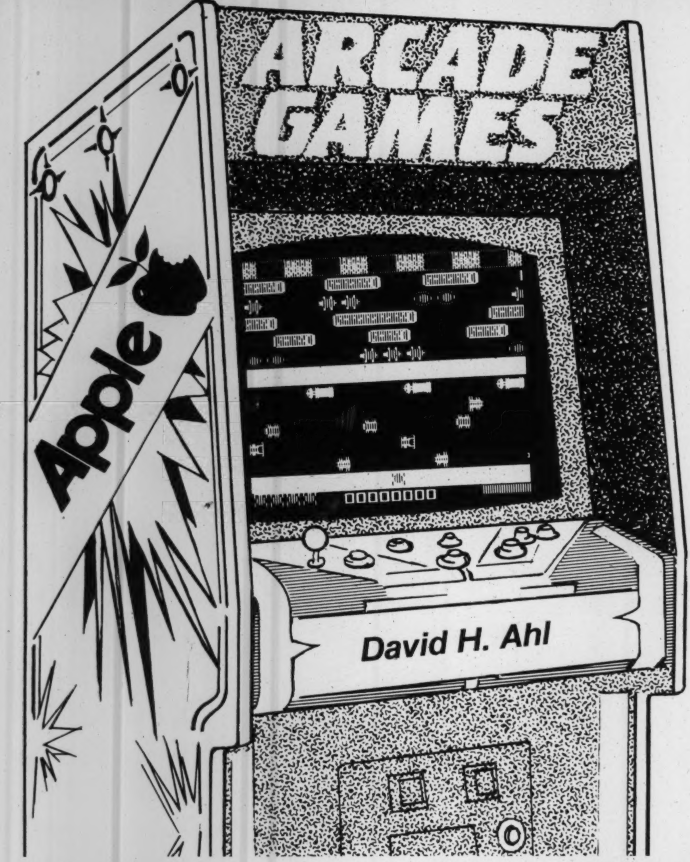
As is always the case with TI's Solid State Software Command Modules, a well written instruction manual is included.

As far as the quality of the game is concerned, the layout of the maze is terrific. It is three-dimensional and well thought out. Excellent graphics and some really imaginative sounds will keep you going for hours at a time.

I have two daughters and three nephews who are video addicts and range in age from six to fourteen; a better cross section of critics would be hard to find. These kids have played about 100 games on my 99/4 and no other has held their attention as long as this one. □

Robert W. Cashman, 11 Hallenan Ave., Lawrence, MA 01841.

telesoft
software at warehouse prices
CALL TOLL-FREE 1-800-547-5400 FREE CATALOG
OREGON 1-503-738-7828
— Apple, TRS-80, Atari, IBM —
Adventure Int'l. - Broderbund - Budgeco - Datamost - Hayden - On-line Systems - Sirius - Visicorp and many more.
VISA
master charge
CIRCLE 288 ON READER SERVICE CARD



creative computing software evaluation

Eleven for the Apple in One Basket

Kamikaze

Mention Hayden Software and what does it bring to mind? Probably *Sargon* or a bunch of boring business packages. Well, along with a change in location from Rochelle Park, NJ to Lowell, MA, Hayden Software is making a change in product direction. *Kamikaze* is the first in a series of arcade games planned for release over the next six months.

creative computing

SOFTWARE PROFILE

Name: Kamikaze

Type: Arcade game

System: 48K Apple, Disk Drive, Paddles

Format: Disk

Language: Machine

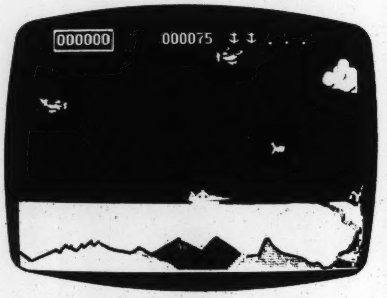
Summary: Tough challenge against a relentless enemy.

Price: $34.95

Manufacturer:
Hayden Software
50 Essex St.
Rochelle Park, NJ 07662

The theme is simple. You, the player, control a ship on patrol, presumably in the South China Sea. Paddle 0 controls the position of the ship from left to right on the screen. Your enemy takes the form of two torpedo planes flying overhead, one from left to right and the other from right to left at two different altitudes. They constantly drop torpedoes (or bombs) on your patrol boat. At your disposal you have a missile launcher (controlled by the paddle button) with which you can launch high speed surface-to-air missiles against your relentless enemy. But don't take time to congratulate yourself for shooting down a plane because a new one takes its place virtually immediately.

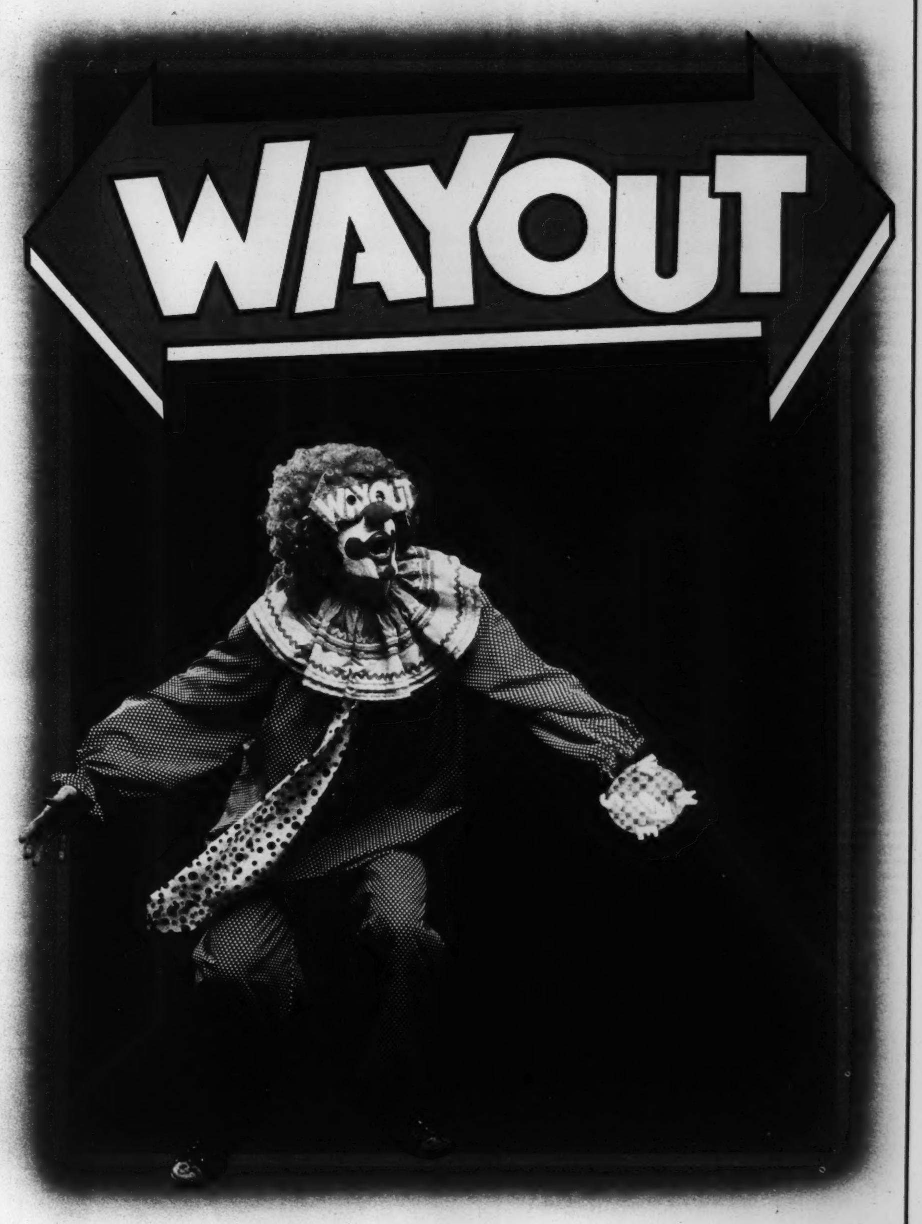
Shooting the high flying plane is worth 50 points whereas the lower flying plane is worth 25 points. You have five ships to start. For each 1000 points accumulated, you earn an extra ship. However, earning 1000 points also brings you face to face with the fearless (and foolish) Kamikaze pilots. Rather than fly from side to side, these insane pilots swoop down from the top of the screen, changing course as you do, ever heading toward your vulnerable patrol boat. Your missiles are effective against the Kamikaze planes, but in order to use them you must get under the plane first. It's not easy! Indeed, it's nearly impossible. Not that you will have to worry about it very often! Reaching 1000 points is anything but easy.



Kamikaze.

We found one possible strategy was to linger near the right side of the screen, get into sort of a rhythm to hit the lower flying green plane on each pass from the left side. On the other hand, this yields only 25 points per hit so it takes far longer to amass 1000 points. Another successful strategy employed by one of the members of our playing panel was to maneuver toward the center of the screen which subjects you to more enemy fire but also affords you the opportunity of hitting one or both planes.

Although *Kamikaze* has only one central theme with no variations that we were able to discern, our panelists found it



Step right up! It's new, it's fun, it's aMAZing! It's WAYOUT, a game so exciting it can make a blind man talk, a deaf man see! Step right up and put on these wayout protective goggles. Good! Now take this compass and mapmaker and step inside this hallway. Excellent! OK now, I'm gonna lock you inside and see if you can find your WAYOUT!

See those fireflies? They'll show ya which way the wind is comin' from — if you don't get blown over first. Oh, and beware the Cleptangle. He loves to sneak off with your mapmaker and compass. Whadya think? Pretty WAYOUT, eh?

Yes, people everywhere are going out of their way to play WAYOUT from Sirius. The first 3-dimensional maze game of its kind with 26 different adventures to lose yourself in. WAYOUT requires an Apple II or II+ Computer with 48K and one Apple disk drive and is playable with keyboard, Apple-compatible paddles or joystick or with an Atari-type joystick attached to a Sirius Joyport.

Wayout, © 1982 Sirius Software, Inc. Sirius and Joyport are trademarks of Sirius Software, Inc. Apple is a trademark of Apple Computer Inc. Atari is a trademark of Atari Inc. Sirius is not affiliated with Atari Inc.

Sirius™
Sacramento, California

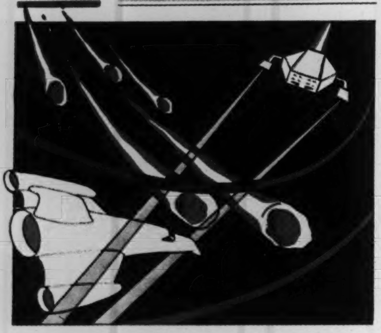
CIRCLE 263 ON READER SERVICE CARD

ACTION IN 3-D!

Great Games From Piccadilly Software Inc.

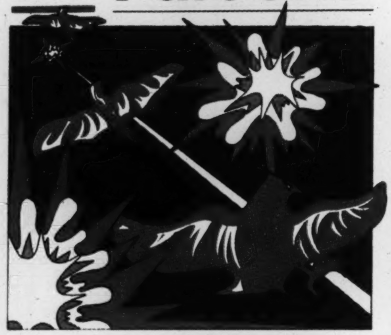
Piccadilly Software Presents

Star Blaster



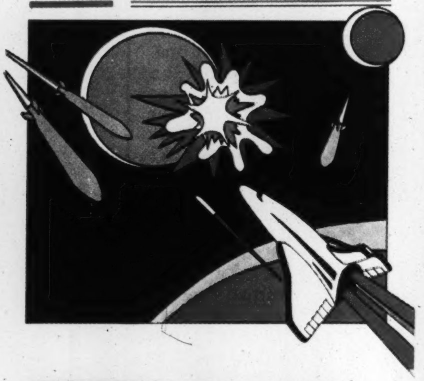
Piccadilly Software Presents

Falcons



Piccadilly Software Presents

Warp Destroyer



Piccadilly Software Presents

Survival

Piccadilly Software Presents

Suicide!

Piccadilly Software Presents

Succession

COMING IN THE 2ND HALF OF 1982

Available at your local dealer.

Requires: APPLE II/APPLE II PLUS with 48K in Dos 3.3 or 3.2 • APPLE III

Piccadilly Software Inc. • 89 Summit Avenue • Summit, N.J. 07901 • (201) 277-1020

If you're unable to obtain Piccadilly Games from your local dealer, send $29.95 per game plus $1.50 per order for postage and handling. NJ residents add 5% sales tax. Outside US, send $3.00 per order for shipping.

*Apple is a registered trademark of Apple Computer Inc.

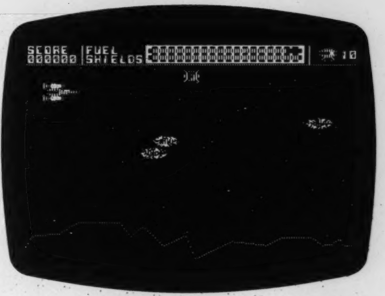
CIRCLE 241 ON READER SERVICE CARD

quite challenging, some to the point of frustration. Nevertheless, we applaud Hayden for entering the exciting field of arcade games.

Rear Guard

Rear Guard is loosely based on the arcade game, *Defender*. In it, you are flying a spaceship from left to right across the screen (actually the ground and other objects are scrolling from right to left giving the illusion of flight). In the game, it's you against an armada of alien ships of different types. Five ships come at you from the right and are worth between 25 and 200 points. A freighter flies in the same direction as you (left to right) and is worth 300 points. In addition, a satellite identified by an F on its side that later changes to an S flies by. Hitting the satellite while it displays an F gives you a fuel recharge, while hitting it with an S gives you a shield recharge. The level of your fuel and shields is shown at the top of the screen along with the score and the number of LGG's remaining.

LGG's? Yep. The object of the game is to survive by preventing the ground-based LGG's (Little Green Guys) from collecting the orange energy pods that are dropped by destroyed alien fighters. These pods are vital because they can be traded in at the end of each game level for fuel, shields and/or bonus points. If you are like me, and constantly run out of fuel, you will want to trade your pods for additional fuel. The players on our panel tried different strategies, but whatever strategy you employ, the important thing is to eliminate the LGG's. This is done by swooping down close to the surface of the planet and shooting them as they speed by from left to right. The danger, of course, is swooping too low and hitting the surface of the planet, and missing out on a passing fuel or shield satellite.



Rear Guard.

Although it is theoretically possible to play the game with the keyboard or paddles, we felt that to maintain your sanity, a joystick was necessary. In summary, *Rear Guard* is a fast-moving, colorful game that brings *Defender* home to the Apple. The game saves the top ten scores and player names, a thoughtful touch that we applaud. Also thoughtful is the policy of Adventure International to furnish a backup disk at the cost of $3.99.

creative computing

SOFTWARE PROFILE

Name: Rear Guard
Type: Arcade game
Author: John Anderson
System: 48K Apple, Disk Drive, Joystick
Format: Disk
Language: Machine language
Summary: Fast-paced and tough
Price: $29.95
Manufacturer:
Adventure International
P.O. Box 3435
Longwood, FL 32750

Fly Wars

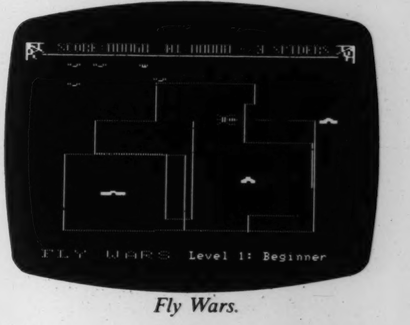
Looking at the *Fly Wars* package, one can't help but be taken by the marvelous 3-D graphic effect. The software jacket is printed on a plastic card with narrow vertical stripes in which you see a different picture depending upon the angle of viewing. In this case, the title, *Fly Wars*, flits around like a pesky fly. You can almost hear the buzzing.

Our temptation is to relate new Apple arcade-type games to their coin-op counterpart in the arcades. Okay, so this relates to *Qix* and *Amidar*, but that is being unfair! *Fly Wars* is different and quite original.

In the game, you are a spider. You are able to leave an etch-a-sketch type of trail on the screen; up, down, right, and left are the directions you may move and leave your trail. The flies flit about the screen from left to right and right to left. Your object is to trap these flies in an enclosed space which can "loosely" be thought of as your web. Each fly you trap is worth 20 points.

Trap a fly, gobble him up and, lo-and-behold, a caterpillar appears. Devour this little creature and he leaves a colorful cocoon at the bottom of the screen. Head down quickly, and push the cocoon from the bottom of your web to the top and you get a 200-point bonus.

At the beginning skill level, 200 points is enough to advance you to Level 2. Level 3 begins at 800 points and the next five levels begin at 800 point increments. But beware, it's not easy to reach them. Increasingly, you'll find showers of bug spray coming after you. Unlike nasty aliens, in shoot-'em-up games, the bug spray can't be eliminated; your only defense is to avoid it.



Fly Wars.

As you enlarge your web, the screen becomes crowded and empty space for trapping new insects is scarce. When this happens, you can "turn off" the web with your joystick button or the "P" key and simply crawl off the right or left edge of the screen to a new play area.

Fly Wars can be played with an Atari-type joystick connected to a Sirius Joyport. If you have five fingers which reliably do what your brain asks them to do, you can play *Fly Wars* from the keyboard.

If you want an exercise in unbelievable frustration, try playing *Fly Wars* with a paddle. Different points in the rotation correspond to different directions of spider movement. Sirius Software claims that some people like this method of control. We haven't found any (although, I confess, I have not visited Greystone Park, our local psychiatric hospital recently).

Seriously folks, *Fly Wars* is wonderful fun, but if you really want to be serious about it, you ought to have a Sirius Joyport to use as your electronic fly-swatter.

creative computing

SOFTWARE PROFILE

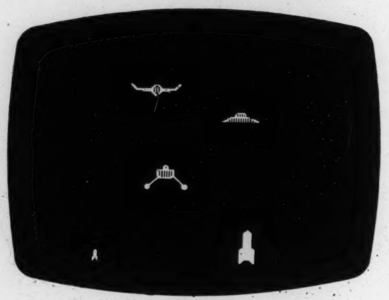
Name: Fly Wars
Type: Arcade game
Author: Duane Later
System: 48K Apple, Disk Drive, Sirius Joyport recommended
Format: Disk
Language: Machine Language
Summary: Trap bugs with etch-a-sketch
Price: $29.95
Manufacturer:
Sirius Software
10364 Rockingham Dr.
Sacramento, CA 95827

Procyon Warrior

This disk contains two games, the first of which is *Procyon Warrier.* The scenario makes you the commander of a space station which is under attack from planet earth. You have two weapons with which to defend your space station: small plasma bombs (useful against drones) and a remote controlled neutrino missile that is effective against the modest ship. The instructions tell us that "You will have only one neutrino missile available for use against each attacking fleet, so make it count."

Sound different? It is and it isn't. It's different in that you have two weapons on the screen at once, one controlled by paddle 0, and the other by paddle 1. From there on, the differences end. Each ship can move from side to side across the bottom of the screen. The smaller weapon can fire repeatedly although only two bombs may be on the screen at one time. As the instructions say, the larger missile must be saved for the attacking mother ship and must be aimed with care. In the first wave of attackers, there are three drone ships before the mother ship appears. On higher waves, there are more drone ships before the mother ship makes her appearance.

If you can anchor your paddles to the table top, you may be able to play this game single-handedly. Frankly, our playing panel found the only reasonable way to play was in teams of two, with one player firing the small plasma bombs and the other keeping the neutrino missile out of the way until the mother ship appeared. Even with this strategy, however, we found that the somewhat erratic motion of the drone ships made high scores as much a matter of chance as skill. Indeed, one team of players after scores of games, did not achieve as high a score as they did on their second game when they were simply "feeling their way around the controls."



Procyon Warrior.

creative computing

SOFTWARE PROFILE

Name: Procyon Warrior

Type: Arcade game

System: 48K Apple, Disk Drive,
Paddles and Joysticks

Format: Disk

Language: Machine language

Summary: Nice graphics, frustratingly tough

Price: $24.95

Manufacturer:
Synergistic Software
5221 120th Ave., S.E.
Bellevue, WA 98006
(206) 226-3216

In the second game on the disk, *Appointment at Aldebran*, you must navigate through a field of asteroids and space pirates toward your home planet. You have a shield which affords you some measure of protection from collisions with asteroids and blasts from the space pirates, however, you'll have better luck if you attempt to avoid such collisions. In addition, you have 15 missiles which may be fired at the space pirates.

We found a joystick necessary to play this game. With it, it was a relatively simple matter to navigate through the asteroid field, though getting the space pirates was something else entirely! Two or three was usually the best we could do.

If shooting the space pirates was difficult, landing on the planet was nearly impossible. If you approach at too steep an angle you burn up in the atmosphere, whereas a shallow approach causes your ship to skip off into deep space and become lost. As the instructions say, "you must follow the fine line just short of overheating." Unfortunately, we never found it.

Jellyfish

The instructions tell us that, "your submarine, Dogstar, is on a dangerous mission to recover several discarded nuclear waste capsules from the ocean floor. The Dogstar has been equipped with a special mechanical arm for this purpose. It has also been outfitted with plenty of torpedoes used to blast belligerent Jellyfish, octopuses, and squid that seem intent on cutting your mission short. While torpedoing the sea creatures will rack up points, it also causes these underwater wonders to break up into smaller units that keep coming at you."

Jellyfish may be played with either the keyboard, Apple paddles (or joystick), or Atari-type joystick through a Sirius Joyport. We found these three modes of play quite different. The keyboard mode uses four keys that are adjacent to one another for up, down, left, and right movement as well as for lowering the mechanical arm and firing. Since *Jellyfish* can be played by either one or two players there is one cluster of five control keys on the left and another on the right side of the keyboard, one for each player. While this particular method of controlling the submarines was relatively straightforward, most of our players were not particularly keen about it.

creative computing

SOFTWARE PROFILE

Name: Jellyfish

Type: Arcade game

System: 48K Apple, Disk Drive,
Sirius Joyport recommended

Format: Disk

Language: Machine Language

Summary: Your own submarine;
best for two players

Price: $29.95

Manufacturer:
Sirius Software
10364 Rockingham Drive
Sacramento, CA 95827

But if they were less than enthusiastic about keyboard control, they were downright hostile about Apple paddles or joystick control. The method of control is most unusual: rotating the paddle or pushing the joystick a different distance will move the submarine up, down, right, and left in a clockwise or counter-clockwise direction. This was a totally alien feeling and none of our players ever got the hang of it.

On the other hand, everyone agreed that an Atari-type joystick used with the Sirius Joyport provided natural movement and control, i.e., when you move the joystick left, the submarine moves left and so on. We don't see why a similar pattern of control could not be provided for a standard Apple joystick. However, as we have commented once before, that does not sell Joyports. Lest we be accused of cynicism, on with the evaluation.

All of our players agreed that the game was great fun when played with Atari-type joysticks through Sirius Joyport. Furthermore, most of them agreed that the two-player version was more fun than playing the game solo.

With two players, many offensive and defensive strategies can be employed. For example, when a player's torpedo destroys a jellyfish or other sea creature, it splits into many fragments which float up toward the surface of the water. These fragments are lethal to a submarine. Hence, after your torpedo hits a sea creature it is vital to get out of the way

DISCSAVERS

VINYL PROTECTIVE DISK SLEEVES

Projections
DISCSAVERS
Color Protective Disk Sleeves
Receivables
Personal
Utility

COLOR CODED: Multi-color DiscSavers™ are designed for easy recognition of individual disks with your own color-keyed filing system. Ideal for office or home use.

PROTECTIVE: Custom grain vinyl provides added protection for magnetic disks by guarding against common handling hazards.

ATTRACTIVE: DiscSavers provide a handsome and professional method of single disk storage and enhance the look of your hardware while protecting your valuable software.

DURABLE: Rigid vinyl construction protects against constant handling to ensure long wear and tear.

PORTABLE: DiscSavers are the only portable vinyl disk sleeves for use with a single diskette that bear the RockRoy mark of quality.

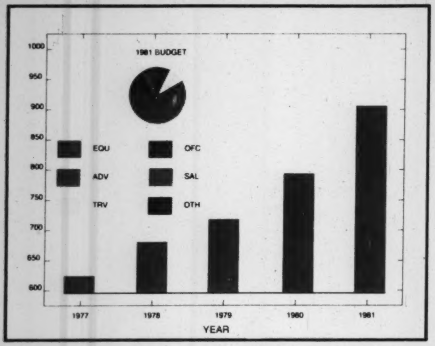
Assorted Colors • 12 Per Box • $6.29.

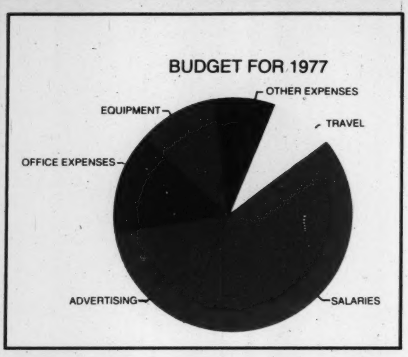
ROCKROY INC.
Computer Products Division

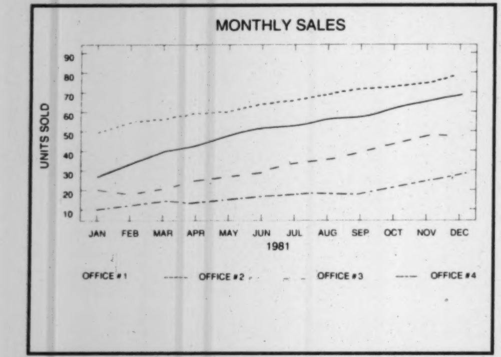
7721 E. Gray Road
Scottsdale, Arizona 85260
(602) 998-1577
Toll-Free 800-528-2361

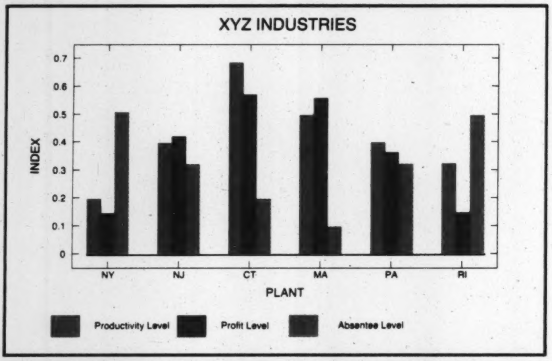
DiscSavers is a trademark of RockRoy Inc.

CIRCLE 229 ON READER SERVICE CARD









Be your own chartmaker.

All it takes is GrafTalk™ and a little plain English.

We think GrafTalk is one of the most ingenious programs to come along since the birth of the microcomputer.

It turns out graphic designs, and text, so easily you can do it on your first try. And you don't have to be a computer expert.

Pie charts, bar charts, symbol and mixed charts, all accomplished on your desktop computer through a few simple instructions in plain English, all printed out on your printer.

No more handing over your figures to others. Then waiting around to see how the charts come out. Then waiting again. For revisions. And no more design expenses.

Further, in a bigger sense, GrafTalk helps you know your business better. For it lets you visually plot everything that's happening—share of market, quality control, sales trends, name it and you have it.

Not just when you have the time or budget. But anytime. GrafTalk puts it all at your fingertips. In color. Or in black and white. Depending on your equipment.

We sell and distribute GrafTalk worldwide, along with more than 200 other programs, all usable with most microcomputers on the market. We are, by a wide margin, the world's biggest single source of micro and minicomputer software—with offices in the U.K., Switzerland, West Germany, Sweden, France and Japan. And a nationwide Technical Hot Line that you can depend on.

Just give us a call at (212) 860-0300. Or fill out the coupon.

Lifeboat Associates
1651 Third Avenue
New York, New York 10028
TWX: 710-581-2524 (LBSOFT NYK)
TELEX: 640693 (LBSOFT NYK)

☐ Send me information on GrafTalk.
☐ Send me The Complete Lifeboat Catalog.

Name Title
Company
Street
City State Zip
Phone

CC-10

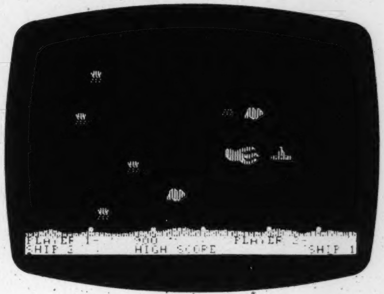
Lifeboat Associates

World's foremost software source.

Copyright © 1982 by Lifeboat Associates
GrafTalk,™ Redding Group, Inc.

REDDING GROUP INC.

CIRCLE 192 ON READER SERVICE CARD



Jellyfish.

quickly. On the other hand, if you can hit a sea creature which is immediately under your opponent, it is generally a sure-fire method of destroying him.

Since the sea creatures attempt to follow a submarine around, another popular strategy is to lure some sea creatures in the direction of your opponent while he is attempting to collect the discarded nuclear waste capsules from the ocean floor. During the collection process, submarines are particularly vulnerable as they cannot shoot and they move at a less-than-normal speed. Attacking your opponent in this way is also likely to cause him to be careless in picking up the capsule which can be disastrous. In particular, if you fail to line up the mechanical pick-up arm correctly, your ship will break open the capsule and you will be destroyed by the deadly nuclear waste.

Jellyfish provides three levels of responsiveness of the submarines and eight skill levels, more than enough for the most fanatic and dedicated players.

The game is great fun and a marvelous diversion from the more-or-less standard space ship shoot-'em-ups and *Pac-Man* offspring.

In short order, *Jellyfish* became one of the all-time favorites of our playing panel.

Oil Rig

We read in the instructions that "*Oil Rig* combines the strategy requirements of a board game with the fast action of an arcade game. Your strategy is to gain enough money through the oil products market to be able to afford the costs of prospecting, oil rigs, and drilling rigs. You also need enough cash to carry you through should you not hit oil."

The display on the screen at all times shows six oil products and eight pieces of equipment along with the quantity that you own, the current value (or price) and your total investment in that particular item. Prices of all of these items change month by month along with your cash, income, and net worth. Initially when you fire up the game, you will be alarmed by the speed of the price changes. The cursor relentlessly plows from the top to the bottom of the screen changing each of the fourteen prices in turn. As soon as one month is completed, the process starts over.

Price changes are affected by three separate variables:

1) Market factors. These are general trends in the market that affect items on the master board. For example, an OPEC price increase would force oil market prices up while off-season travel would cause a general decrease in prices.

2) Individual traits. Each item on the board has a growth rate unique to that item. This may be in the same direction or counter to the overall market.

3) Inflation-deflation. A general trend either up or down is quite distinct from either of the other factors.

creative computing

SOFTWARE PROFILE

Name: Oil Rig

Type: Rigged simulation game

Author: Kevin Bagley

System: 48K Apple, Disk Drive, Paddles

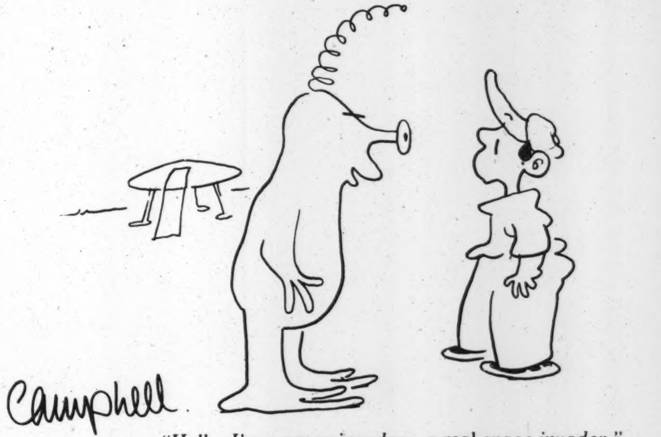
Format: Disk

Language: Compiled Basic

Summary: Make business decisions quickly

Price: $29.95

Manufacturer:
Computer Programs Unlimited
9710 Twenty-fourth Ave. S.E.
Everett, WA 98204



"Hello, I'm a space invader... a real *space invader."*

At the beginning of the game you select how many years you wish to play from 10 to 40; the longer the game the easier it is. You also select the level of difficulty from 1 (novice) through 9 (pro).

After bootup, the game immediately starts and you must be ready to make some quick decisions. Since you start with just $1000 of cash and no equipment or product (gasoline, crude oil, etc.) these decisions are relatively simple. In particular you must buy some product so that you can sell it later on.

* OIL RIG *
BY
KEVIN BAGLEY

Oil Rig.

Since you must scan 14 items rather hurriedly, I initially adopted a rather simple playing convention, which was to buy products when their value was a single digit and to buy equipment when its value was under $300, assuming I had enough money. In general, this got me going (although not always!). Then I could start keeping an eye on whether prices were going up or down.

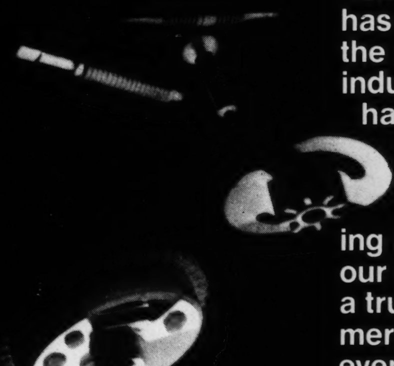
I also found it easier to buy in multiples of 10 or 100. By so doing I could check my total value to the left against the individual value of items in the center column and, at a glance, tell if I could easily make money by selling or if I was behind. Multiples other than 1, 10, or 100 I found nearly impossible to check fast enough in my head to make intelligent sell decisions.

Be sure to read the instructions under the heading "Prospecting" carefully. The instructions admonish you to remember the location from which your core sample was taken (such as 18-12). The first few times I went prospecting, I was so excited that I forgot to remember from where my sample was taken and, when I returned to drill later on, I sunk a dry hole. Also,

STAR.
WE'RE MAKING A

NAME FOR OURSELVES.

Building a reputation for quality printers of astronomical value, from components on up.



Making a name for ourselves in printers is only natural when we've been making the highest quality precision parts for over 30 years. And although Star's reputation in microperipherals has only begun to grow, the watch and camera industries worldwide have been relying on Star components for nearly 3 decades.

Quality manufacturing is what we're building our reputation on. Star is a true manufacturer, not merely an assembler. We even design and manufacture the computer controlled machines that make our parts. With unlimited production capabilities, Star's factories can operate 365 days a year, 24 hours a day, producing more than 100 million parts a month. It is this kind of productivity and total quality control that assures you of getting the very finest printer for the very lowest price.

And the best product for less is what you can depend on getting from Star. Star offers you a full line of reliable printers, printers with divergent technologies to meet your specific needs. And there's more. You get a low cost, high quality printer with a wide spectrum of interfaces to choose from—backed by Star's superior service network, there if you need it.

Star. We're going to be the quality printer you can count on, from components on up. And that's no pie in the sky promise.

star
micronics·inc

MAKING A NAME FOR OURSELVES
200 PARK AVENUE, NY, NY 10166
CIRCLE 277 ON READER SERVICE CARD

beware of drilling too soon! You'll need a reserve of at least $8-10,000 for sinking a hole.

As you get deeper into the game, you'll find you are spending more and more money. Be sure to heed the instruction that advises keeping at least $20,000 but not more than $100,000 cash on hand (to avoid being taxed to death).

Don't be discouraged if the first half dozen or even dozen times that you play you quickly go bankrupt. I did. But eventually I got the hang of it. Then I convinced myself that I was playing with someone else's money and really got into the swing of things. No, I'm not ready to take on Exxon or even Brock Petroleum, but I sure had a good time trying to get into C.P.U. Software's Tycoon Club in which they will refund the cost of the disk if you hit a gusher on your final score. I never did, but I had fun trying.

Star Base Gunner

The instructions tell us that *Star Base Gunner* "is a 3-D type game where you will be shooting into the screen at enemy ships located mathematically a great distance behind the screen." In other words, ships that are further away appear to be smaller and appear to move more slowly. In the lower levels of play (there are ten levels), you have a range finder. Using the joystick, all you have to do is line up the target ship between two horizontal marks on the side of the screen and below an arrow on the top. When the target is lined up, you may use one of three weapons: a laser beam (fired by button 1), a photon torpedo (fired by button 0), or a neutrino pulsar (fired by the Escape key). This third weapon may not be fired until you have achieved a score of over 2000. On the lower levels, the rangefinder will automatically shoot your weapon the correct distance.

creative computing

SOFTWARE PROFILE

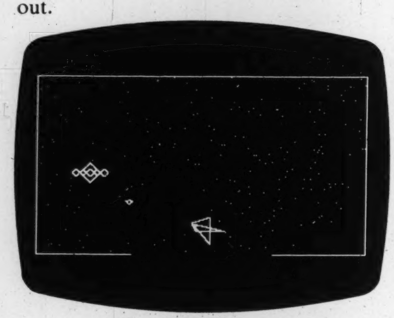
Name: Star Base Gunner
Type: Arcade game
System: 48K Apple, Disk Drive, Joystick
Format: Disk
Language: Machine language
Summary: Easy to play, nice 3-D graphics effects
Price: $29.95
Manufacturer: Apple-Jack Software
P.O. Box 269
Auburn, MA 01501

Your goal is to keep your three solar arrays two energy storage units behind each array intact. They are the source of your power, so should they suffer damage, you will run out of power and the game is over. You are protected as long as your shield power is above 200.

As the game progresses you may find it necessary to put energy in the shields from your weapons system. This is done with the right arrow key. You may also get energy from the shields with the left arrow key.

While the instructions tell us that it is possible to play with paddle controls, we found that a non-centering joystick was vastly preferable.

The instructions spend many paragraphs talking about depth and perception relating it to the size of the target and the angular position of the gun site. While this was all very interesting, we found there was nothing like three or four rounds of play to get a good feel for the game. Once we did, we had no trouble progressing up through the lower levels. But eventually, kaboom! we got wiped out.



Star Base Gunner.

We found it curious that once we had aimed and fired our weapon the target obligingly stood still waiting for either a hit or miss. In most games, you have to anticipate where a target is going to be when your weapon hits and fire at that spot. However, in *Star Base Gunner* you simply have to get the target between your gun sights, fire and, if you were accurate in your sighting, you will get a hit. (This is reminiscent of the *Star Wars* game written by Bob Bishop, oh, so many years ago and now available on Apple Games Pak from *Creative Computing Software*. We can't help but feel that if joysticks were widely available three or four years ago, that *Star Wars* would have been one of the most popular arcade games of all time. As it was, perhaps it was too much and too soon).

Although *Star Base Gunner* was an interesting game, we think that it is probably a far better demonstration of the excellent Designer Graphics System by Apple Jack Software than it is a game in its own right. On the other hand, if you are looking for an up-to-date version of *Star Wars* with color and sound, perhaps this is your cup of tea.

Neptune

In *Neptune*, you are the Commander-In-Chief of the naval vessel, Neptune. Your mission is to seek and destroy enemy robot amphibians that have inhabited neutral waters.

Although you are commanding a submarine and the theme is nautical, *Neptune*, in reality, is another version of the arcade game, *Defenders.*

Your submarine is traveling from left to right (actually the underwater terrain is scrolling by from right to left). As you travel along, small purple robots bounce from the top to the bottom of the screen and back again. In addition, cute little white faces with large red bow-ties bob about on the ocean floor.

Purple robots may be shot with your laser beam while the bobbing creatures must be trapped with depth charges dropped on top of them. After going through a group of these nasties, you come upon some "flying" saucer type of underwater vessels moving rapidly from right to left. These can be either avoided or shot (for 80 points each).

You then encounter a large cave (no nasty creatures). Unfortuntely there is only one way through the cave and you must choose it long before you can see whether it is the right one. A little ESP, or just plain guess work is helpful here.

Following this, you enter a narrow cave containing vessels that cannot be shot. Here, you need quick reflexes and peripheral vision to see what's coming on the screen from the right both in terrain and enemy vessels as you stay toward the left center of the screen.

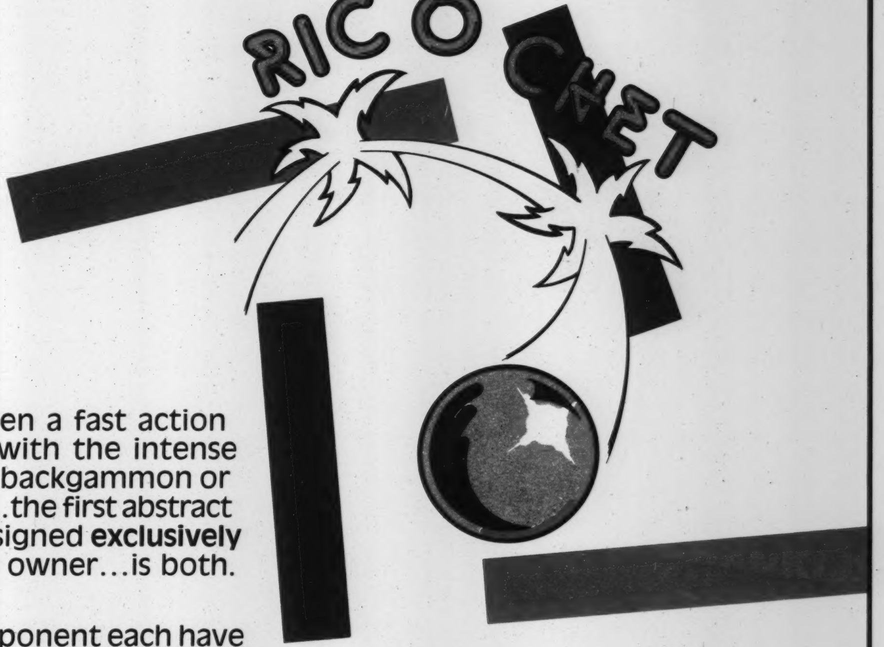
Get through the cave, and you can finally dock at your fuel station. Whew! Move your ship downward and to the

creative computing

SOFTWARE PROFILE

Name: Neptune
Type: Arcade game
Author: Nasir
System: 48K Apple, Disk Drive, Joystick
Format: Disk
Language: Machine language
Summary: Challenge, excellent graphics
Price: $29.95
Manufacturer:
Gebelli Software Inc.
1771 Tribute Rd., Suite A
Sacramento, CA 95816

It's Here! The Computer Strategy Game with Bounce!



For:
Apple
Atari
TRS-80

Have you ever seen a fast action game combined with the intense strategy of chess, backgammon or Othello? Ricochet…the first abstract strategy game designed **exclusively** for the computer owner…is both. And loads of fun!

You and your opponent each have six opposing blocks to maneuver and two launchers to fire. Your shots ricochet off the blocks, changing their position with every hit, while earning you points on the way to their targets. The longer your shot ricochets, the more points you get.

You don't have to play alone, either. Play against any of four different computer opponents, (each a different personality), or another human. Five game variants to choose from—each requires a different strategy.

Ricochet is truly competitive…if you want it to be. A "smart clock" lets you put more pressure on your opponent by forcing him to play faster than you. But you've got to win two out of three (or three out of five) games to claim victory.

Your computer rates you after each match, so you can compare your mastery of the game with that of other players. In the long run, you're trying to rack up points for your personal Ricochet Rating.

Get Ricochet now at your local dealer for your Atari, Apple or TRS-80. Suggested retail price: $19.95.

Another Mind Toy From EPYX

COMPUTER GAMES THINKERS PLAY

*APPLE, ATARI and TRS-80 are trademarks of Apple Computer, Inc., Atari, Inc. and Tandy Corp., respectively.

© 1981, AUTOMATED SIMULATIONS, INC.
P.O. Box 4247, Mountain View, CA 94040.

CIRCLE 116 ON READER SERVICE CARD

FRANKLIN ACE 1000

THE BEST DEAL IN TOWN!

THE FRANKLIN ACE 1000

You just can't beat an ACE. Especially the Franklin ACE 1000. It's the professional personal computer with all the trump cards—it costs less, it includes 64K of RAM, upper and lower case, a numeric pad and VisiCalc® keys, all features not found on the Apple® II.

Peripherals that work with the Apple II will work with the Franklin ACE 1000. Programs that run on the Apple will run on the ACE. Totally Apple compatible . . . yet, so much more!

The Franklin Ace 1000—price, power, quality, reliability—the best deal in town. Call or write today for the name of your local authorized Franklin dealer.

FRANKLIN
COMPUTER CORPORATION

7030 Colonial Highway
Pennsauken, NJ 08109
609-488-1700

Franklin ACE is a trademark of Franklin Computer Corporation
Apple is a registered trademark of Apple Computer Inc.
VisiCalc is a registered trademark of Visi Corp.

CIRCLE 169 ON READER SERVICE CARD

WHO ARE YOU THIS TIME?

Are you the seeker of lost treasures in an enchanted realm of magical beings? Perhaps you're an astronaut, thousands of light years from earth, searching the galaxy's rim for the fabulous treasures and advanced technologies of a long-dead civilization. Maybe you're the plunderer of ancient pyramids in a maddeningly dangerous land of crumbling ruins and trackless desert wastes.

[illegible]

You wish to soar to other worlds, to behold wonders never beheld by mortal eyes, to dream unrestrained to the furthest limits of your imagination.

[illegible]

The ADVENTURE SERIES by Scott Adams has been reviewed by **every** major microcomputing magazine, receiving only the highest praise for its mind-puzzling challenge & refreshing originality. Tens of thousands of adults and children have matched wits with the Adventure Master. Now, it's your turn. If you crave the challenge and panorama of the exotic, touched with sparkling humor, then the Adventure Series is for you.

With the incredible Adventure Series by Scott Adams,
YOU ARE WHOMEVER YOU WANT TO BE, WHENEVER YOU WANT TO BE!

Adventure
INTERNATIONAL
1982 A DIVISION OF SCOTT ADAMS, INC.

BOX 3435, LONGWOOD FL 32750
(305) 862-6917 (QUESTIONS)
ORDER FROM YOUR FAVORITE DEALER
or CALL TOLL FREE (800) 327-7172
(ORDERS ONLY PLEASE A.I. #119)

CIRCLE 103 ON READER SERVICE CARD

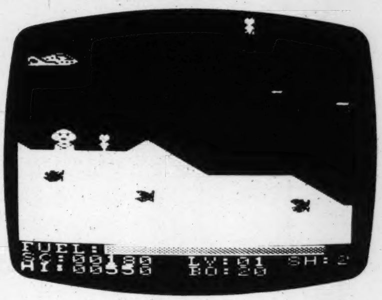
	SINGLE TAPE	12 PACK TAPE	SINGLE DISK	TRIPLE DISK	12 PACK DISK
APPLE	$19.95 24K	$129.95† 24K	$29.95* 48K	$69.95* 48K	—
ATARI	$19.95 24K	$129.95† 24K	—	$39.95 40K	$129.95† 48K
CP/M (Z-80)	—	—	—	—	$129.95†
TRS-80 MOD 1&3	$19.95 16K	$129.95† 16K	—	$39.95 32K	$129.95† 32K
TRS-80 MOD 2	—	—	—	—	$129.95

Adventure Hint Book (All 12)	$ 7.95
Adventure Hint Sheet (Single)	1.00
Commodore VIC (Cartridge)	39.95
T.I. 99/4 (Tape or Disk)	29.95

Requires Adventure Command Module

*Scott Adams' Graphic Adventure Series Apple Disks-Full Color Hi-Res Graphics.
†12 Adventure Hint Book Incl.

[illegible]



Neptune.

right, and you're on way to a higher level, which is characterized by less maneuverability, changes in the underwater environment and aquatic life, and a faster pace.

The high score after each boot-up is saved, but high scores are not saved to the disk. All the members of our playing panel strongly preferred the joystick option. Incidentally, you will need a joystick with two quick fire buttons; the Apple Peripherals division (formerly the Keyboard Company) joystick just won't do for this game.

In summary, *Neptune* employs the spectacular graphics and excellence of execution that we've come to expect from Nasir in his years of producing games for Sirius Software. There's no question, that *Neptune* has all the makings of another big winner!

Bandits

Although nestled in a corner booth at the West Coast Computer Faire, Sirius Software was drawing huge crowds of people to watch the play of a new arcade game. They had a full-sized video arcade game, the interior of which had been gutted and replaced with an Apple computer and color monitor. In addition, the game play was being shown on a large-screen projection TV set. The game they picked to show—Bandits. The effort was worth it; the game created quite a sensation!

creative computing

SOFTWARE PROFILE

Name: Bandits

Type: Arcade

System: 48K Apple, Disk Drive, Joystick recommended

Format: Disk

Language: Machine language

Price: $34.95

Manufacturer:
Sirius Software, Inc.
10364 Rockingham Drive
Sacramento, CA 95827

Now, away from the hoopla, our playing panel has had a chance to evaluate Bandits in the comfort of our game room. The verdict: sensational!

At the start of play, you have a group of five items (fruits, vegetables, etc.) clustered at the right side of the screen. Alien bandits then come in and assemble at the left side of the screen outside the reach of your laser cannon. After they have assembled, they take off in various formations, flying and swooping about the screen, raining bombs upon your base at the bottom and making for your goods at the right.

At your disposal, you have a laser cannon which can blast the aliens into smithereens and you have shields which can protect you from their bombs.

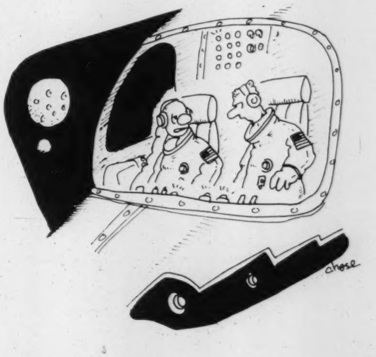
Bandits has 28 levels of play; each level has a different group of items on the right and features a different combination of bandits that go after your goods.

You score 100 points for each supply item remaining after obliterating all of the bandits in an attacking wave. For each level you advance, you pick up an additional 100 points for each remaining supply item (maximum 500). If the bandits steal all of your supplies, the game is over.

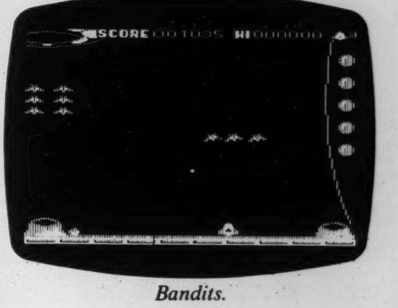
You begin with five ships and are awarded a bonus ship for each 5000 points.

Shields are a mixed blessing. While they provide total protection against bandit fire or bombs, you only have a limited amount of shield energy. Shield energy is totally replenished with each new ship and slowly replenished during sustained play when the shields are not in use.

The variety of attack formations and aliens is staggering. Indeed, they cannot all be stored in memory at one time; thus, the disk must be kept in the drive so that each attacking formation can be loaded as play proceeds.



"I'm bored. Let's play rocket-rendevous on the computer again!"



Bandits.

The game may be played from the keyboard which uses the right and left arrow keys for movement, space bar for firing, and "S" for shields. We found this the least satisfactory method of play. Far better was a paddle or joystick with the knob (or stick) for movement, button 0 for firing, and the space bar for shields. Even better, was a switch-type (Atari) joystick attached to a Sirius Joyport. Joystick movement controls the base, while the button fires your laser and a forward tilt of the joystick activates the shield. We don't see why this movement convention could not have been offered with a standard joystick, but, cynically we observe that doing so would not sell Joyports. We also longed for a continuous fire feature, similar to the *Centipede* arcade game or its Apple look-a-like, *Photar.*

The high score of Bandits is saved each time the disk is booted up, however, it is not permanently recorded. We wish it were along with the player initials.

Nevertheless, despite these criticisms, we found Bandits great fun. If you are looking for nonstop action, look no further; this will give you your fill.

Quadrant 6112

In this easily played and rather nifty game, you navigate a little starship around a small sector of the galaxy defending your turf against nasty aliens. Your quadrant, 6112, is shaped like a rectangle just about the size of a TV screen. What a surprise! Now comes the real surprise. This isn't just another version of an arcade game; it is original!

Located in the middle of your quadrant, are two smaller squares of which the sides, one or two at a time, show only intermittently. These square boxes are actually star gates (or is it the other way around?) from which alien vessels eventually emerge to occupy your quadrant. Your mission, of course, is to blast them to smithereens.

At your disposal, you have the usual

The Choice of

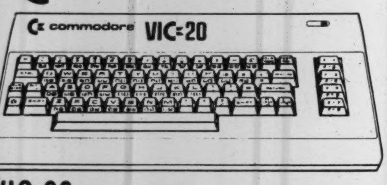
IBM®

IBM-PC SUPPLY CENTER
PERIPHERALS & SOFTWARE FOR THE IBM PC

PERSONAL COMPUTER

			SAVE
HARDWARE:			
CORVUS, Hard Disk Systems. See Corvus section this page			
Microsoft, 64K RAM Card	New!	$395	20%
128K RAM Card	New!	$555	20%
256K RAM Card	New!	$875	20%
64K RAM Chips	New!	$160	20%
Quadram, Quad Board 256K, 4 function brd.	New!	$689	31%
TG Products, Joystick		$ 49	25%
SOFTWARE:			
Automated Sim. Temple of Apshai		$ 29	25%
Cavalier, Championship Blackjack		$ 29	25%
Continental, Home Accountant Plus		$112	25%
Denver, Easy (Exec. Accounting Sys.)		$545	25%
Infocom, Deadline		$ 39	25%
Zork I		$ 23	25%
Zork II		$ 23	25%
Innovative, T.I.M. III (a DBMS)		$369	25%
ISM, Mathmagic		$ 69	25%
★ **Insoft**, Accountant *For each GL, A/R, A/P or Payroll. Absolutely the best IBM-PC accounting software we have seen. We use it and recommend it highly. A best buy!*		$ 99	
Info. Unlimited,			
Easywriter II	New!	$259	25%
Phone Support on Easywriter II		Call	Call
Easyspeller (88K words)	New!	$129	25%
Easyfiler (a DBMS)	New!	$299	25%
Micro Pro, Wordstar	New!	$249	40%
MailMerge	New!	$ 79	40%
SpellStar		$149	40%
Sorcim, Superwriter		$295	25%
Super Calc		$219	25%
Visicorp, Visicalc		$159	20%
Visicalc/256K		$199	20%

commodore



VIC 20 Home Computer	**$229**	**24%**
Datasette VIC 1530	$ 59	20%
Disk Drive VIC 1540	$479	SAVE
Super Expander VID 1211A 3K with lots of extras	$ 56	20%
3K Memory Expander Cartridge	$ 32	20%
8K Memory Expander Cartridge	$ 48	20%
16K Memory Expander Cartridge	$ 88	20%
VIC Modem, Telephone Interface	$ 96	20%
VIC/IEEE-488 Interface	$ 80	20%
Joystick	$ 8	20%
Game Paddle Pair	$ 15	20%

Software full line in stock. Call

ATARI®

			SAVE
800 Computer 16K		**$665**	38%
800 Computer 32K		**$747**	37%
800 Computer 48K		**$777**	40%
400 Computer 16K	**Special!**	**$225**	**25%**
810 Disk Drive		**$444**	26%
850 Interface		$159	25%
410 Recorder		$ 79	21%
820 Printer 40 Col. Impact		$269	14%
822 Printer 40 Col. Thermal		$279	14%
830 Acoustic Modem		$159	28%
16K RAM		$ 85	15%
32K RAM		$109	20%
Le Stick by Datasoft		$ 29	28%
Game Paddles (pair)		$ 18	20%
Joystick (pair)		$ 18	20%
SOFTWARE:			
Visicalc, Disk		$189	25%
Word Processing, Disk		$119	23%
Pacman, Cart	New!	$ 35	22%
Centipede, Cart	New!	$ 35	22%
Caverns of Mars, Disk		$ 31	23%
Touch Typing, tape		$ 19	23%
Personal Financial Mgt. Disk		$ 55	22%
Entertainer Kit, Cart		$ 79	33%
Educator Kit, Cart		$125	29%
Programmer Kit, Cart		$ 55	22%
Communicator Kit, Cart		$335	26%
Dow Jones Invest. Disk		$ 99	24%
Temple of Apshai by Automated, Disk		$ 29	25%
Apple Panic by Broderbund, Disk		$ 23	25%
Raster Blaster by Budgeco, Disk		$ 23	25%
Bug Attack by Cavalier, Disk		$ 23	25%
Text Wizard by Datasoft, Disk		$ 75	25%
Compu-series by Edu-Ware, Disk		Call	25%
Deadline by Infocom, Disk		$ 37	25%
Zork II by Infocom, Disk		$ 29	25%
Asteroid by On-Line, Disk		$ 20	25%

Portland, OR, Cash & Carry Outlet

11507-D SW Pacific Hwy., Pacific Terrace Shop. Ctr., Tigard, OR. Over-the-counter sales only. On 99W between Rte. 217 and Interstate 5. Call 245-1020.

CP/M BUSINESS & DEVELOPMENT SOFTWARE

		SAVE
Adventure, Adventure's #1 to #12 inclusive, 8"	$ 95	26%
★ **Ashion-Tate**, dBase II, 8"	$495	30%
Datasoft, Mychess, 8"	$ 39	25%
Fox & Geller, Quickcode for dBase II	$249	13%
Quickscreen for dBase II	$129	13%
dUtil for dBase II	$ 75	25%
Infocom, Deadline, 8"	$ 45	25%
Zork II, 8"	$ 39	25%
Innovative, Spellguard, 8"	$220	25%
★ **Insoft**, Accountant, 8", each module *For each GL, A/R, A/P or Payroll. Absolutely one of the best accounting software system available. We use it and recommend it highly. A best buy!*	$ 99	
MicroCraft, Legal Billing & Time Keeping	$395	45%
Prof. Billing & Time Keeping	$395	45%
MicroPro, Wordstar, 8"	$249	40%
Datastar, 8"	$199	40%
Mailmerge, 8"	$ 79	40%
Super Sort, 8"	$150	40%
Word Master, 8"	$ 90	40%
Spell Star, 8"	$150	40%
Calc Star, 8"	$180	40%
Microsoft, Fortran-80, 8"	$325	25%
Basic Compiler, 8"	$295	25%
Cobol-80, 8"	$545	25%
Basic-80, 8"	$275	25%
Peachtree, Magic Wand, 8", Word Processor	$275	30%
GL, A/R, A/P, PR or Inventory, 8"	$325	35%

HEWLETT PACKARD

			SAVE
★ **H/P 85A Microcomputer/Monitor/Printer**	Special!	$1795	36%
H/P 87A CP/M Microcomputer	Special!	$1795	29%
★ **H/P 125 CP/M Microcomputer**	**New!**	**$1965**	30%
H/P 82901M 5" Dual Drives		$1595	28%
H/P 7225B Professional Graphics Plotter	Special!	$1795	35%
★ **H/P 7470A** Graphics Plotter	New!	$1125	28%
★ **H/P 8290B** Serial Printer	Special!	$ 850	50%
H/P 41C Calculator		$ 185	25%
H/P 41CV Calculator 2.2K		$ 245	25%
Card Reader for HP41		$ 159	27%
Printer/Plotter for HP41		$ 289	25%
Optical Wand for HP41		$ 89	25%
Software:			
Visicalc + for HP87		$ 189	25%
Visicalc + for HP125		$ 159	20%
★ **Accountant** by Insoft for HP125 *For each GL, A/R, A/P or Payroll. Absolutely the best HP125 accounting software we have seen. We use it and recommend it highly. A best buy!*		$ 99	
Full line of HP accessories and software		Call	Call

CORVUS SYSTEMS

		SAVE
6 Meg Hard Disk	$2495	20%
11 Meg Hard Disk	$3995	20%
20 Meg Hard Disk	$4795	20%
Mirror built-in for easy backup	$ 649	20%
Apple Interface	$ 239	20%
Apple III Interface (SOS)	$ 239	20%
IBM PC Interface (IBM DOS)	$ 239	20%
Xerox Interface (CP/M)	$ 239	20%
NEC Interface (CP/M)	$ 239	20%
TRS-80 Interface (call)	Call	20%

Other Interfaces, Omni-Net, Constellation, Mirror. All in Stock.

NEC

		SAVE
8001 32K Computer	$ 739	25%
286K Total, Dual Drive PC8031	$ 739	25%
32K addon and I/O Unit PC8012	$ 485	25%
Ren Tec "The Wedge" 32K	$ 495	17%
8023 Impact Printer F/T	$ 480	25%
Impact Printer Cable	$ 49	25%
3510 Letter Quality Daisy Wheel Printer	$1995	20%
Monitor, 12" Green	$ 159	25%
Monitor, 12" Color	$ 349	25%
Software:		
NEC CP/M DOS for NEC 8001	$ 115	25%
NEC Report Manager	$ 135	30%
NEC General Accounting	$ 239	40%
NEC Accounts Receivable	$ 239	40%
NEC Inventory System	$ 239	40%
NEC Payroll System	$ 239	40%
NEC Game Pack I	$ 24	20%
NEC Game-Pack II	$ 24	20%
NEC Word Processor	$ 395	20%
Infocom, Zork II	$ 29	25%
Deadline	$ 39	25%
Insoft, Accountant *For each GL, A/R, A/P, or Payroll. Absolutely the best NEC accounting software we have seen. We use it and recommend it highly. A best buy!*	$ 99	

μ-SCI MICRO-SCI

FOR THE APPLE II/II+ DIRECT SUBSTITUTES for APPLE DRIVES

Micro-Sci A2 drives and/or controllers are direct plug compatiable substitutes foi Apple drives and controllers. A2 will run all Apple software. Save over $350 on an A40 or A2 dual drive system. We use them and highly recommend the product.

★ A2, 5¼", 143K Disk Drive	$369	23%
Controller Card for A2 Drive	$ 79	21%
A40, 5¼", 160K Disk Drive	$359	20%
A70, 5¼", 286K Disk Drive, Double Density	$479	20%
Controller Card for A40 or A70 Drive	$ 79	21%
Filer, Disk Utility Software System for A2 Drives	$ 15	25%

OVERSTOCK SPECIAL for the apple® II/II+

SPECIAL

		SAVE
ALS 16K AddRAM Card	$ 59	60%
ALS ZCard, Z80 CP/M Card	$199	27%
ALS Smarterm 80 Col. Card	$229	34%
ALS Synergizer Pack	$450	40%
ALS Synergizer Pack with Supercalc by Sorcim (while they last)	$495	53%

PRINTERS, Daisy Wheel

			SAVE
★ **Qume**, Sprint 9, 45 Cps. RO	SPECIAL!	$1750	33%
Sprint 5, 45 Cps. RO	SPECIAL!	$1795	40%
★ **Olympia** (Typewriter/Printer) ES-100 18CPS, with full cable and interface to Apple II		$1295	24%

PRINTERS, Impact

			SAVE
Epson See Epson section below			See below
IDS, Prism 132, Color w/Graphics		$1595	20%
Prism 80, Color, w/Graphics		$1495	17%
Pager Tiger 445C, w/Graphics & 2K	Special!	$ 595	35%
Pager Tiger, 560, w/Graphics		$ 995	30%
Okidata, Microline 82A, 120 Cps. 80 Col. Para & Serial		$ 495	15%
Microline 84S, 200 Cps. 136 Col. Serial, 200 Cps.		$1295	15%

EPSON PRINTERS & ACCESSORIES

		SAVE
MX80 w/Graftrax	$425	31%
Mx80 F/T w/Graftrax +	$525	25%
MX100 F/T w/Graftrax +	$695	27%
Apple Interface and Cable for MX80/MX100	$ 95	15%
Graftrax 80 for MX80	$ 79	20%
Epson/Atari Cable	$ 30	26%
Epson TRS 80 Cable	$ 30	26%
Grappler by Orange Micro, Specify Computer	$129	21%

MONITORS

			SAVE
NEC, 12" Green		$159	25%
12" Color, Composite		$349	25%
Sanyo,			
9" B&W		$149	25%
★ 9" Green,	Overstock Special	$139	36%
12" B&W		$199	20%
12" Green		$199	25%
13" Color, Composite		$349	25%
Zenith, 12" Green		$119	30%
Amdek, 12" Green #300		$159	38%
13" Color I, Composite		$359	20%
13" Color II, RGB		$799	20%
Color II to Apple II Interface		$159	20%
Comrex, 13" Color, Composite		$349	27%
13" Color, RGB for IBM-PC		$529	15%

DISKETTES

★CDC 12 for 10 Special. Limited Time!

		SAVE
CDC, 120 each, 5¼, with ring, SS, SD (Apple, IBM, etc.)	$195	57%
12 each, 5¼, with ring, SS, SD (Apple, IBM, etc.)	$ 22	45%
12 each, 5¼, with ring, SS, DD (H/P, etc.)	$ 28	45%
12 each 8", SS, SD	$ 28	45%
Verbatim, 10 each 5¼, with ring, SS, SD	$ 28	45%
Maxell, 10 each 5¼, SS, SD	$ 35	33%
Dysan, 10 each 5¼, SS, SD	$ 39	30%
10 each 5, DS, DD	$ 49	25%

ORDERING INFORMATION AND TERMS: We ship immediately on Cashier Checks, Money Orders, Fortune 1000 Checks, and Government Checks. Personal Checks and Company Checks allow 20 days to clear. Add 3% for VISA or MC. Add 3% for shipping, insurance and handling (minimum $5). UPS ground is standard. Add 10% more for US Postal, APO or FPO. Include telephone no. No COD. Prices subject to change and typographic errors, so call to verify. All goods are new, include factory warranty, and are guaranteed to work. Due to our low prices all sales are final. Call before returning goods for repair or replacement. ORDER DESK HOURS: 8 to 6 PST, M-F. 10 to 4 Sat. & Sun. 1 p.m. here is 4 p.m. in NY.

OUR REFERENCES: We have been a computer dealer since 1978 and in mail order since 1980. Banks: First Interstate Bank, (503) 776-5620 and Jefferson State Bank, (503) 773-5333. We belong to the Chamber of Commerce, (503) 772-6293, or call Dun & Bradstreet if you are a subscriber. Computer Exchange is a division of O'Tech Group, Inc.

VISA

master charge

NO SALES TAX

Oregon Order Desk
(503) 772-3803

Ad #937

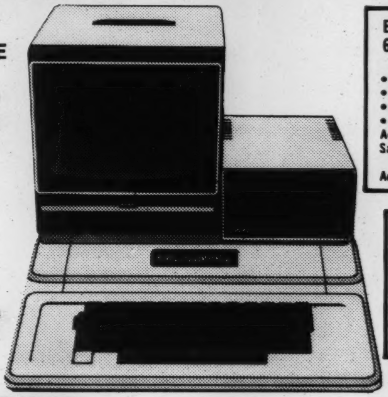
NATIONAL ORDER DESK TOLL FREE
(800)547-1289

Professionals

Manufactured Exclusively for **Bell & Howell** by **apple computer**

	LIST PRICE	OUR PRICE	SAVE
B&H Apple II+			
64K (48K + ALS 16K)	$1725	$1195	$530
DISK II w/3.3 Cont.	$645	$520	$125
DISK II Only	$525	$450	$75

OR: SAVE OVER $350 on a pair of drives.
Buy a pair of Micro-Sci A2 Drives.
See opposite page.



SPECIAL

B & H APPLE II+
64K STARTER SYSTEM **$1,795**
SAVE $ 765

- **48K B&H Apple II+**
- **ALS 16K RAM Card**
- **Disk II with 3.3 DOS & Controller**
- **Sanyo 9" Green Monitor**

Add $60 for Apple Beige color.
Save $832 total. Substitute a A2 Micro-Sci drive for the Disk II.
Add another A2 drive and save a total of $888.

B & H APPLE II+
64K BUSINESS
STARTER SYSTEM **$2,240**
SAVE $1,125

Starter System above plus:

- **ALS ZCard, Z80 CP/M Card**
- **ALS Smarterm 80 Column Card**
- **Sorcim Supercalc (while they last)**

apple® II/II+ supply center

HARDWARE
for Apple II/II+

MICRO-SCI. Disk Drives. Plug/software compatiable to Apple. See opposite page.

		SAVE
RAM CARDS:		
Microsoft. 16K RAM Card	$ 149	33%
★ **ALS.** 16K ADDRam	$ 59	60%
Saturn Systems. 32K	$ 169	25%
64K	$ 319	25%
128K	$ 459	25%
VC Expand 40 or 80	$ 75	25%
Axlon. 320K RAM Disk system	$1145	20%
80 COLUMN VIDEO CARDS:		
ALS. Smarterm	$ 229	34%
Videx. Videoterm	$ 249	28%
See more **ALS** and **Videx** under Miscellaneous		
Vista. Vision 80	$279	30%
M&R. Sup R term	$ 319	15%
MISCELLANEOUS:		
ALS. Smarterm 80 Col. Card Special	$ 229	34%
Z Card (Z-80) W/CPM Special	$ 199	27%
16K ADDRam Special	$ 59	60%
Synergizer Pack Special	$ 450	40%
★ Synergizer with free Sorcim Supercalc. (While they last)	$ 495	53%
Apple Computer.		
Silentype II Printer	$ 335	15%
Graphics Tablet	$ 675	15%
Joystick II	$ 39	22%
Game Paddle	$ 19	27%
Numeric Keypad	$ 119	21%
Axlon. 320K RAM Disk System	$1145	20%
CCS. Serial Interface 7710A	$ 139	22%
Other CCS Cards in stock	Call	Call
Dan Paymar. Lower Case Chips	$ 34	33%
Hayes. Micromodem II	$ 289	25%
Smartmodem	$ 229	20%
ISC. Videostick Paddle	$ 35	23%
Kensington. System Saver Fan	$ 75	20%
★ **Keyboard Company.**		
Joystick II	$ 39	22%
Game Paddle	$ 19	27%
Numeric Keypad	$ 119	21%
M&R. RF Modulator	$ 25	27%
SupRFan	$ 39	25%
★ **Microsoft.** Z80 Softcard	$ 269	33%
16K RAM Card	$ 149	33%
SoftcardPremiumPack	$ 579	25%
Mountain.		
CPS Multifunction Card	$ 209	13%
★ Clock/Calendar	$ 195	30%
Novation. Applecat Modem	$ 329	16%
Orange Micro. Grappler	$ 129	21%
★ **Practical Peripherals.** w/cable & Conn.)		
MBS 8K Serial (Epson) New!	$ 129	20%
MBP 16K Para (Epson) New!	$ 129	20%
★ Microbuffer II 16K New!	$ 209	20%
Microbuffer II 32K New!	$ 229	24%
RH Electronics. Super Fan II	$ 59	21%
SSM. A10 Serial/Para Interface	$ 159	20%
TG Products: Game Paddles	$ 29	28%
Joystick	$ 45	25%
★ **Videx.** Videoterm 80 col.	$ 249	28%
Soft Video Switch	$ 25	29%
Enchancer II	$ 99	34%
Function Strip	$ 59	26%
Enchancer (Rev 6 or 7 +)	$ 99	25%
Full Videx Line	Call up to 35%	

SOFTWARE on disk for Apple II/II+

BUSINESS

		SAVE
Apple Computer, Inc.		
50% Off on Apple III Software	Call	50%
The Controller (Accounting)	$499	20%
Apple Writer 1.1	$ 59	20%
Apple Pascal	$199	20%
Apple Fortran	$159	20%
DOS Tool Kit	$ 59	20%
DOS 3.3 Upgrade Kit	$ 59	20%
Apple Plot	$ 59	20%
DJ News & Quotes	$ 75	20%
DJ Portfolio Evaluator	$ 45	20%
How to!	$ 39	20%
Microcourier	$199	20%
Micro Telegram	$199	20%
Time Manager	$119	20%
Many Others	Call	Call
Applied Soft Tech., Versa Form	$289	26%
Artsci. Magic Window	$ 75	25%
Ashion-tate. dBase II (CP/M)	$495	30%
Beagle Bros., Utility City	$ 22	25%
Broderbund. Payroll	$269	30%
General Ledger	$349	30%
Continental. CPA #1 General Ledger	$189	25%
CPA #2 Accounts Rec.	$189	25%
CPA #3 Accounts Pay.	$189	25%
CPA #4 Payroll	$189	25%
CPA #5 Property Mgt.	$189	25%
Denver. Financial Partner	$185	25%
dBase II for Apple II/II+ CP/M	$495	30%
Fox & Geller. Quickscreen for dBase II	$129	13%
Quickcode for dBase II	$259	13%
Hayden. Pie Writer (Specify brd.)	$125	25%
H&H Trading. Stock Tracker	$129	32%
Market Tracker	$199	33%
High Tech., Store Mgr.	$189	25%
★ Job Control Sys.	$469	40%
Info Master	$119	40%
Info. Unlim., Easywriter (PRO)	$139	25%
★ **Innovative.** Spellguard (CP/M)	$150	50%
Insoft. Accountant (CP/M)	$ 99	
For each GL, A/R, A/P or Payroll. Absolutely the best accounting software available for the Apple II/II+. Better than Peachtree. We use it and recommend it		
LJK. Letter Perfect	$112	25%
★ **Micro Craft.**		
(CP/M) Legal Billing & timekeeper	$250	65%
Prof. Billing & timekeeping	$250	65%
Micro Lab. Data Factory ver 5.0	$249	20%
Visifactory New!	$ 56	25%
Invoice Factory	$129	35%
Tax Manager	$ 95	38%
Micro Pro. (all CP/M)		SAVE
★ Word Star NewVersion	$199	47%
MailMerger	$ 69	45%
SpellStar	$119	40%
DataStar	$169	40%
CalcStar	$169	40%
SuperSort I or II	$119	40%
Muse. Super Text II	$113	25%
Super Text 40/80 New!	$129	25%
Form Letter New!	$ 75	25%
On-Line. Expediter II	$ 75	25%
ScreenWriter II	$ 95	27%
Osborne/C.P. Soft., (Disk and Book)		
★ Some Common Basic Programs. 75 Business. Statistics and Math programs for the Apple II	$ 49	50%
★ Practical Basic Programs. 40 more very valuable programs beyond "Some Com. Basic Prog"	$ 49	50%
Peachtree. GL, AR, AP or Inv. each	$189	36%
★ Magic Wand (Specify board)	$250	50%
Phoenix. Zoom Grafix	$ 29	28%
Sensible. Apple Speller	$ 55	27%
Silcon Valley. Word Handler	$150	40%
Solldus/Softech		
★ Stockfile	$250	60%
Stockseller	$425	40%
Software Publishing.		
PFS II or III NEW version!	$ 89	30%
PFS Report II or III	$ 69	30%
Sorcim. Super Calc. (CP/M)	$219	25%
Southeastern.		
Data Capture 4.0. specify brd.	$ 69	25%
Source. The Source	$ 75	25%
Stoneware. DB Master	$179	22%
DB Utility I or II	$ 75	10%
VisiCorp/Personal Software.		
Visicalc 3.3	$189	25%
VisiDex Special!	$175	30%
VisiFile	$199	25%
Desktop Plan II or III Special!	$175	30%
Visiplot	$159	20%
VisiSchedule New!	$239	20%
VisiTrend and VisiPlot Special!	$210	30%
VisiTerm	$ 79	20%
Zork	$ 33	20%

UTILITY & DEVELOPMENT

Beagle. Utility City	$ 22	25%
DOS Boss	$ 18	25%
Central Point Software:		
Filer, DOS Utility	$ 18	25%
★ Copy II Plus (bit copier)	$ 35	10%
Will copy most copy protected software for your backup in 45 seconds or less! Highly recommended.		
Epson. Graphics Dump	$ 9	35%
Insoft.		
★ GrafFORTH by Paul Lutus New!	$ 59	22%
ALD System II by Paul Lutus	$ 59	22%
TransFORTH II by Paul Lutus	$ 99	20%
Electric Duet by Paul Lutus New!	$ 25	20%
Microsoft.		
A.L.D.S.	$110	10%
BASIC Compiler	$299	25%
Cobol 80	$559	25%
Fortran 80	$149	25%
Olympic Decathlon	$ 24	24%
TASC Compiler	$159	22%
★ **Omega.** Locksmith (bit copier)	$ 75	25%
On-Line. Expediter II	$ 75	25%
Phoenix. Zoom Grafix	$ 29	28%
Source. the Source	$ 75	25%
Southwestern. ASCII Express	$ 59	25%
Sub-Logic. Flight Simulator	$ 28	20%
Tymac. Super Pix	$ 20	20%

Warranty: Factory warranty is by Bell and Howell (not by Apple) and is one year parts plus 90 day labor. Warranty service available at Bell and Howell service centers or return to Computer Exchange.

Apple is a registered trademark of Apple Computer Inc.

★ Means a BEST buy.

HOME & EDUCATION

		SAVE
Autom. Sim., Crush Crumb Chomp	$ 30	25%
Broderbund.		
Apple Panic	$ 21	30%
Arcade Machine	$ 32	30%
Red Alert	$ 21	30%
Space Warrior	$ 18	30%
Star Blazer New!	$ 24	30%
Many others	Call	Call
Budgeco. Raster Blaster	$ 22	27%
Calif. Pacific. Ultima	$ 30	25%
Cavalier. Bug Attack	$ 23	23%
Continental. Home Accountant	$ 56	25%
Home Money Minder	$ 26	25%
LA Land Monoply	$ 23	25%
DataMost. Snack Attack	$ 22	25%
Thief	$ 22	25%
Edu-Ware. Compumath	$ 29	25%
Hayden. Sargon II (Chess)	$ 29	22%
Infocom. Deadline New!	$ 38	25%
Zork	$ 29	25%
Insoft. Electric Duet by Lutus New!	$ 25	20%
GraFORTH by Lutus New!	$ 59	25%
Lightning. Mastertype	$ 29	25%
Microsoft. Olympic Decathlon	$ 24	24%
Typing Tutor	$ 19	30%
Muse. Robot War	$ 29	25%
On-Line. Pegasus II	$ 22	25%
Mouskattack New!	$ 26	25%
Time Zone New!	$ 75	25%
Jawbreaker New!	$ 23	25%
Ultima II New!	$ 27	25%
Marauder New!	$ 26	25%
Threshold	$ 30	25%
Cranston Manor	$ 26	25%
Mission Astroid	$ 15	25%
Mystery House	$ 19	25%
Softporn (X Rated)	$ 22	25%
Ulysses and Golden Fleece	$ 22	25%
Piccadilly. Falcon	$ 23	25%
Star Blaster	$ 23	25%
Sentient. Oo-TOPOS	$ 25	25%
Sirius. Sneakers	$ 22	25%
Gorgon	$ 29	25%
Twerps	$ 22	25%
Sir-Tec. Wizardry New!	$ 39	22%
Strategic. Southern Command	$ 30	25%

OTHER BRANDS IN STOCK. CALL.

THE WORLD'S LARGEST COMPUTER MAIL ORDER FIRM

Computer Exchange

A Division of
O'TECH Group, Inc.
Ad #937

ALL MAIL: P.O. Box 1380, Jacksonville, OR 97530
WAREHOUSE AND OFFICES, BY APPOINTMENT AT 6791 UPPER APPLEGATE ROAD.

CIRCLE 139 ON READER SERVICE CARD

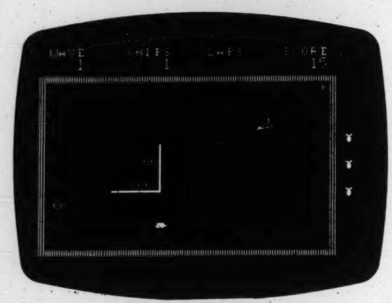
laser cannon in the pointed nose of your ship (fired with paddle button 0) and a "heat seeker" that will destroy every enemy that is in normal space. This is activated by pressing the space bar. The temptation is to press the heat seeker when there are many enemy ships on the screen, however, those that are still within the confines of the star gates are not affected by the heat seekers, hence it is wise to wait until a good number have emerged from these protective enclosures.

Control of your ship is the easiest we've seen in any game. Knob 0 controls the ship direction, short jabs on paddle button 0 fire your laser cannon, while holding down paddle button 0 activates your thrusters. It's simple and reliable. The only thing you must remember is that it takes time for your thrusters to change your direction because, like any object, your ship has inertia. In other words, once you have built up speed in a particular direction, you will continue to move in that direction no matter what direction your ship faces.

In addition to getting points for shooting alien ships, you also get points for navigating around the quadrant. Each time you go to a corner, a small red cross lights up and, when you have scouted all four corners, you score a "lap," which is indicated in a counter at the top of the screen. When you have eliminated the current assault, you receive extra points for each lap completed.

If you complete at least one lap in each of four different attack groups, you are awarded a bonus ship. The number of ships you have left is displayed on the screen at all times.

Every so often the alien commander will emerge to see who has been destroying his ships. Beware! He is a very good shot and extremely fast! Fortunately, he does not stay around for long.



Quadrant 6112.

A thoughtful touch by the author is storing the top ten scores and players names permanently on the disk. We wish more program authors would follow his lead. All in all, *Quardrant 6112* is a fast-moving, easy-to-play game that all of our panelists found good fun.

creative computing

SOFTWARE PROFILE

Name: Quadrant 6112

Type: Arcade game

System: 48K Apple, Disk drive, Paddles

Format: Disk

Language: Machine language

Summary: Fast moving, easy-to-play

Price: $34.95

Manufacturer:

Sensible Software Inc.
6619 Perham Dr., Dept. G
West Bloomfield, MI 48033

Lazer Silk

Lazer Silk is an amazingly imaginative game, in which you are a spider defending your web from annoying bugs and deadly insects. To keep your web from being torn apart, you must bundle (capture) bugs as soon as they fly into your web and land. To do this, you must get close enough to touch them. However, certain enemy bugs will not allow themselves to be bundled and, if you touch them, you will be immediately wiped out. Against them, you must use your own deadly weapon, Lazer Silk, to shoot them as they bombard you.

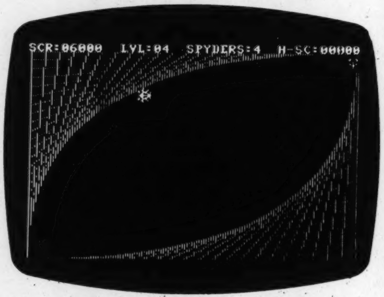
In addition, there are scavenger ants and beetles which scamper around your web and try to steal the bundles for which you have fought so hard. These creatures too may be bundled, but you must reach them quickly.

Another menace is the quick and unexpected electrode which darts around your web, chasing you until either it catches you or you shoot it. In addition, attack spiders occasionally drop fron the top to the bottom of the web; against them there is no defense except to get out of the way.

The web is rectangular with a giant ellipse stretching from corner to corner missing from the center (see illustration). You can travel on any strand of the web which effectively permits you to go up and down, side to side, and diagonally. The game may be played from either the keyboard or a joystick. We found the joystick option far more satisfactory than the keyboard.

We found it took two or three plays of the game to get to know the different bugs on sight. After all, you don't want to go around trying to bundle a bee when it will sting you causing you to lose a life. On the other hand, it is easy to bundle a Xenar mystery bug, but you get 500 points if you shoot it instead. Once you memorize a few of the basics, then it's off to the business of spidering.

On earlier levels, the game seems rather tame and it's generally easy to bundle all of the bugs that land in your web. However, on later levels, you may well find yourself in one corner bundling a medfly when a scavenger ant appears in the diagonally opposite corner and steals two or three of your previously hard-earned bundles. This is bad not only because you lose your bundles but because it leaves holes in your web over which you cannot travel.



Lazer Silk.

All in all, *Lazer Silk* is a clever, imaginative game; it was especially well liked by the girls on our playing panel. Even so, *Lazer Silk* tended to be less frustrating and last longer than most other arcade-type games, a fact appreciated by younger players. ☐

creative computing

SOFTWARE PROFILE

Name: Lazer Silk

Type: Graphics game

Author: Eric Knopp

System: 48K Apple, disk drive, joystick

Format: Disk

Language: Machine language

Summary: Novel theme, easy to play

Price: $29.95

Manufacturer:

Gebelli Software Inc.
1771 Tribute Rd., Suite A
Sacramento, CA 95816

Only Super-Text™ Lets You Choose

...40 character screen display

...or 56 character screen display

...or 70 character screen display

You're a winner when you choose the exciting Super-Text 40/56/70, the only word processor that offers three different screen displays without the use of any additional hardware! At $125.00, Super-Text 40/56/70 gives you features you might not expect for so little cost: page headers and footers, multi-file search and replace, easy to read documentation and quick reference card, and easy text handling all the way through.

And introducing a unique Super-Text feature: design your own characters! Now you can create text in cursive, with accent marks, in any foreign language you need!

Super-Text 40/56/70 . . . another reason why MUSE Software is one step ahead.

For the Apple II with 48K and disk drive, retail price $125.00. Available at computer stores everywhere. Write or call MUSE for information and the name of the dealer nearest you.

Apple II is a trademark of Apple Computer Corporation

MUSE SOFTWARE™

347 N. Charles St.
Baltimore MD 21201 • 301-659-7212

One Step Ahead

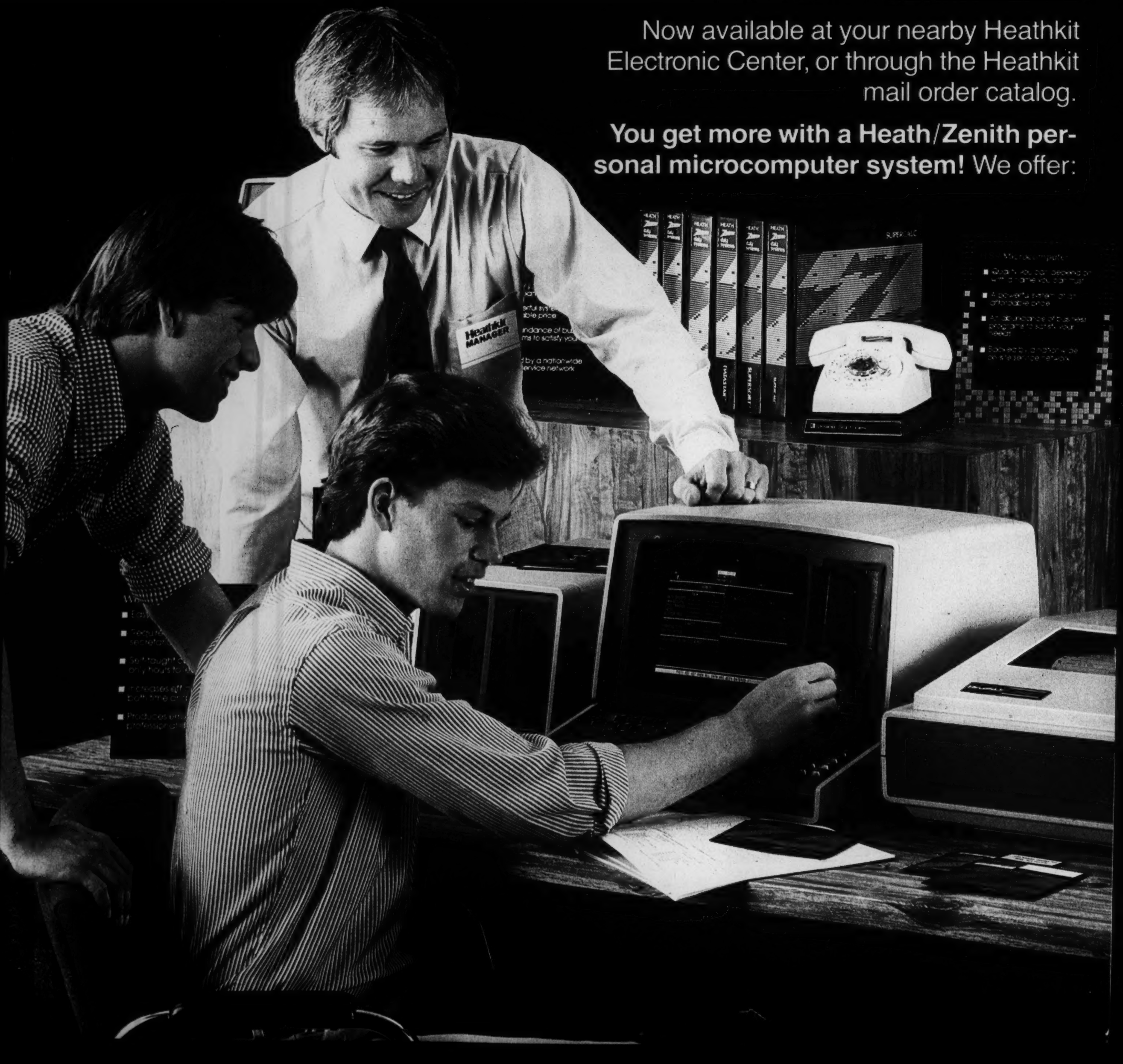
CIRCLE 222 ON READER SERVICE CARD

Let's get

try out the in-stock selection of Heath/Zenith microcomputers, peripherals, accessories and software.

Now available at your nearby Heathkit Electronic Center, or through the Heathkit mail order catalog.

You get more with a Heath/Zenith personal microcomputer system! We offer:



personal...

1. Proven, high-performance hardware: Thousands of our microcomputers are proving themselves daily, in the field.

2. Vast software library: Three operating systems (including CP/M), languages, word processors, an electronic spreadsheet, versatile utilities and the 500-program Heath Users' Group software library.

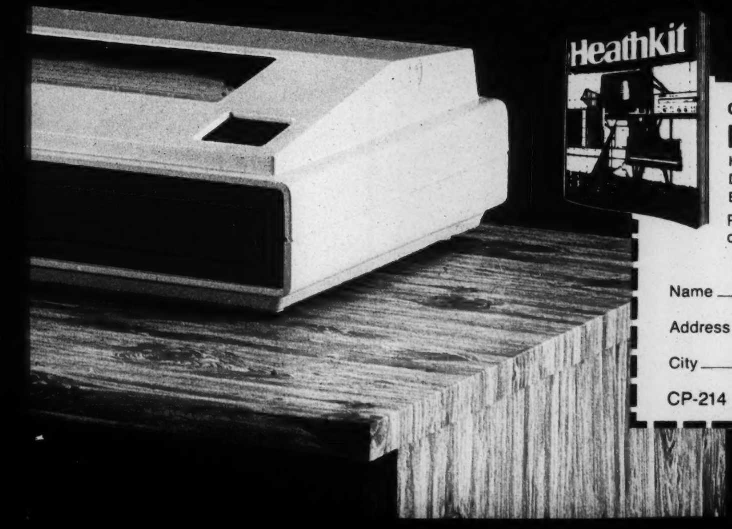
3. Self-instruction courses: Evaluation and programming courses from Heathkit/Zenith Educational Systems.

4. Service support: Before and after the sale – consultation by phone, carry-in service.

Test run one of our microcomputers at any of the more than 60 convenient Heathkit Electronic Centers in the U.S.

Heathkit®
ELECTRONIC CENTERS*

See the white pages of your telephone book for store locations and telephone numbers.



*Units of Veritechnology Electronics Corporation in the U.S.

Or if you prefer, send to the address below for a

FREE catalog:

Heath Company
Dept. 355-944
Benton Harbor, MI 49022

In Canada: Heath Company
1480 Dundas St. E.
Mississauga, ONT L4X 2R7

Please send my free catalog, describing your complete line of microcomputer products!

Name ______________________________

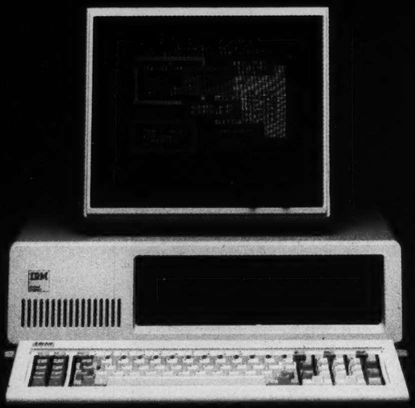
Address ______________________________

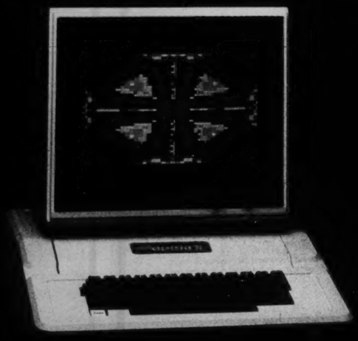
City ____________________ State __________

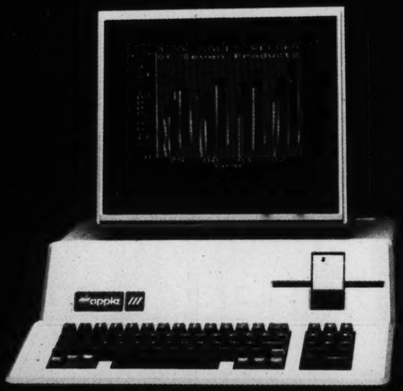
CP-214 Zip __________

GOOD NEWS

Have you put aside buying a color monitor because it's too expensive?
But, have you looked at the new TAXAN RGBvision color monitor?
Would you be excited at a suggested retail price of $399.oo for the RGBvision I, and $599 for the RGBvision II?







DO WE HAVE GOOD NEWS FOR YOU!

For those low prices, you can have:

- ☑ Full compatibility with Apple III and IBM PC without interface modules
- ☑ Compatible with Apple II through the TAXAN "RGB-II" card
- ☑ RGBvision I medium resolution - 380(H) lines
- ☑ RGBvision II high resolution - 510(H) lines
- ☑ Unlimited colors through linear amplifier video circuit and 16 colors for Apple III and IBM PC
- ☑ 12-inch, 90° deflection CRT display

Can you really afford to turn all that down without looking at the TAXAN RGBvision monitors? See your local dealer for a demonstration.

TAXAN 12" green phosphor monitor, model KG12N, features an 800 line resolution at center, 2000 character display.

TAXAN

TSK ELECTRONICS CORPORATION

1524 Highland Avenue
Duarte, California 91010
A subsidiary of Kaga Denshi

Apple II and III are trademarks of Apple Computer, Inc.
IBM PC is a trademark of International Business Machines, Inc.

CIRCLE 293 ON READER SERVICE CARD

Dungeons and Asteroids

David Small

Warlock's Revenge

creative computing
SOFTWARE PROFILE
Name: Warlock's Revenge
Type: Adventure with Hi-Res screens
System: Atari 400/800
Format: Cassette or disk
Language: Basic and machine
Summary: A good adventure game
Price: $34.95
Manufacturer:
Synergistic Software
5221 120th Ave. SE
Bellevue, WA 98006

Warlock's Revenge is an Atari translation of an Apple game, *Oldorf's Revenge*. It is another graphics adventure and seems well done. I didn't encounter any bugs in my playing of it, and I had a good time, although I have to admit I'm beginning to burn out on generic adventure games.

After a certain point, you see, I get tired of trying to figure out which implement I must use to get past a certain point. The game becomes boring, and settles into mere combination testing. While *Warlock's Revenge* suffers from this malady to some extent, it isn't nearly as bad as some I have seen. It wins points for this; there's nothing worse than an unplayable, un-figure-outable adventure.

In this game, you are leading a party into a dungeon. You can be any of several different types of character (cleric, magician, and so on), each of which has special skills. These skills are needed to get past a certain point in the dungeon and to continue the adventure. Be prepared for a great deal of testing of combinations, or perhaps a short session of dumping the game database to the printer. Hint: the game is all *hardcoded*, with all pictures, etc., coded into the program.

The pictures are all done in graphics 8, the highest resolution mode the Atari has. They seem to have had a good amount of work put into them, and the only detraction is that in graphics 8 the Atari doesn't put out a solid line, it tends to candy-stripe and change colors. This is called artifacting and can be of use to a programmer who understands it; the folks who did *Warlock* didn't, I'm afraid, so you would do well to turn off the color on your TV.

The game itself is a fairly standard adventure, with pictures at each stop and two-word commands. It runs fast enough and is fun to play. I recommend it and had a good time playing it, even if (I must confess) I have yet to completely finish it. This one will take you more than a couple hours to do.

> ***Artifacting can be of use to a programmer who understands it; the folks who did Warlock didn't.***

In summary, while it may be "just another adventure," the game is a lot of fun and good to play. Don't let the fact that there is good competition for it worry you; just because there are several good games like it available, doesn't mean this one isn't worth getting. There aren't yet enough adventures on the market to swamp it completely, so if you're into such things, or if you would just like to give one a try, this is a good choice.

Every reviewer has to fight a tendency to be sarcastic when he discovers a game that just doesn't make it. The urge to make cutting comments can be overpowering. In this case I was going to award the Cray-1 Speed In Arcade Games Trophy for this game. But that isn't how I view the purpose of a review. I prefer to try to make constructive comments on games that aren't quite right in the hope that the author(s) will consider my opinions and suggestions and, perhaps, improve the game.

David Small, 11314 Yucca Dr., Austin, TX 78750.

Software City

THE PROGRAM DISCOUNT CENTERS

We know software for personal computers because software is our ONLY business.

Thousands of programs. In stock. At discounted prices.

ARMONK, NY, 146 Bedford Rd. (914) 273-3677
PINE BROOK, NJ, 101 Route 46 East (201) 575-4574
TEANECK, NJ, 161 Cedar La. (201) 692-8298
SUMMIT, NJ, 5 Beechwood Rd., (201) 273-7904
MONTVALE, NJ, 146 Kinderkamack Rd. (201) 391-0931
GREEN BROOK, NJ, 60 Route 22 West (201) 968-7224
FAIRVIEW, NJ, 251 Broad Avenue (201) 943-9444

Stores Opening Soon: Morristown, NJ Hartsdale, NY

ATTENTION EDUCATORS: Write for FREE Software Catalog
Specify: PET / Atari / Apple / TRS-80 ***(Please use school letterhead)***
Academic Software Division, c/o Software City
22 East Quackenbush Avenue, Dumont, NJ 07628

Franchises Available/Box 313, Closter, NJ 07624

© 1982 America's Number One Software Dealer Inc.

CIRCLE 268 ON READER SERVICE CARD

WHAT'S EATING YOUR APPLE?

It used to be that you could spend hours just trying to find out whether software or hardware was responsible for a problem in your computer system.

Now you can find the answer quickly and easily with APPLE-CILLIN II, a comprehensive diagnostic system that verifies more than two dozen hardware operations. In almost no time, APPLE-CILLIN II will identify a specific problem or give your hardware a clean bill of health.

APPLE-CILLIN II is written entirely in assembly language, boots from any slot, works with 13 or 16 sector drives, and requires 16k of RAM and one or more disk drives. And it now features linked tests, 6502 CPU test, printed results, and disk speed test—all for only $49.95. Find out what's eating your Apple, with APPLE-CILLIN II.

XPS, Inc.

Quality Microcomputer Software
323 York Road, Carlisle, PA 17013
(800) 233-7512 / (717) 243-5373

MasterCard VISA

CIRCLE 302 ON READER SERVICE CARD

Dungeons, continued...

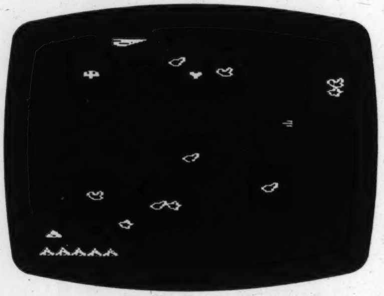
Kayos

creative computing

SOFTWARE PROFILE

Name: Kayos
Type: Arcade
System: Atari 400/800
Format: Cassette or disk
Language: Machine
Summary: Good if you have superhuman reflexes
Price: $34.95
Manufacturer:
Computer Magic Ltd.
P.O. Box 2634
Huntington Station, NY 11746

So we come to *Kayos*. You've guessed it—it doesn't make it. It is very well done technically. It runs faster than most, and obviously a great deal of work went into it. I have no complaint with it technically. However, its human interface isn't very good. It is simply too fast for people. Robots with emitter-coupled-logic reflexes might enjoy it, however.



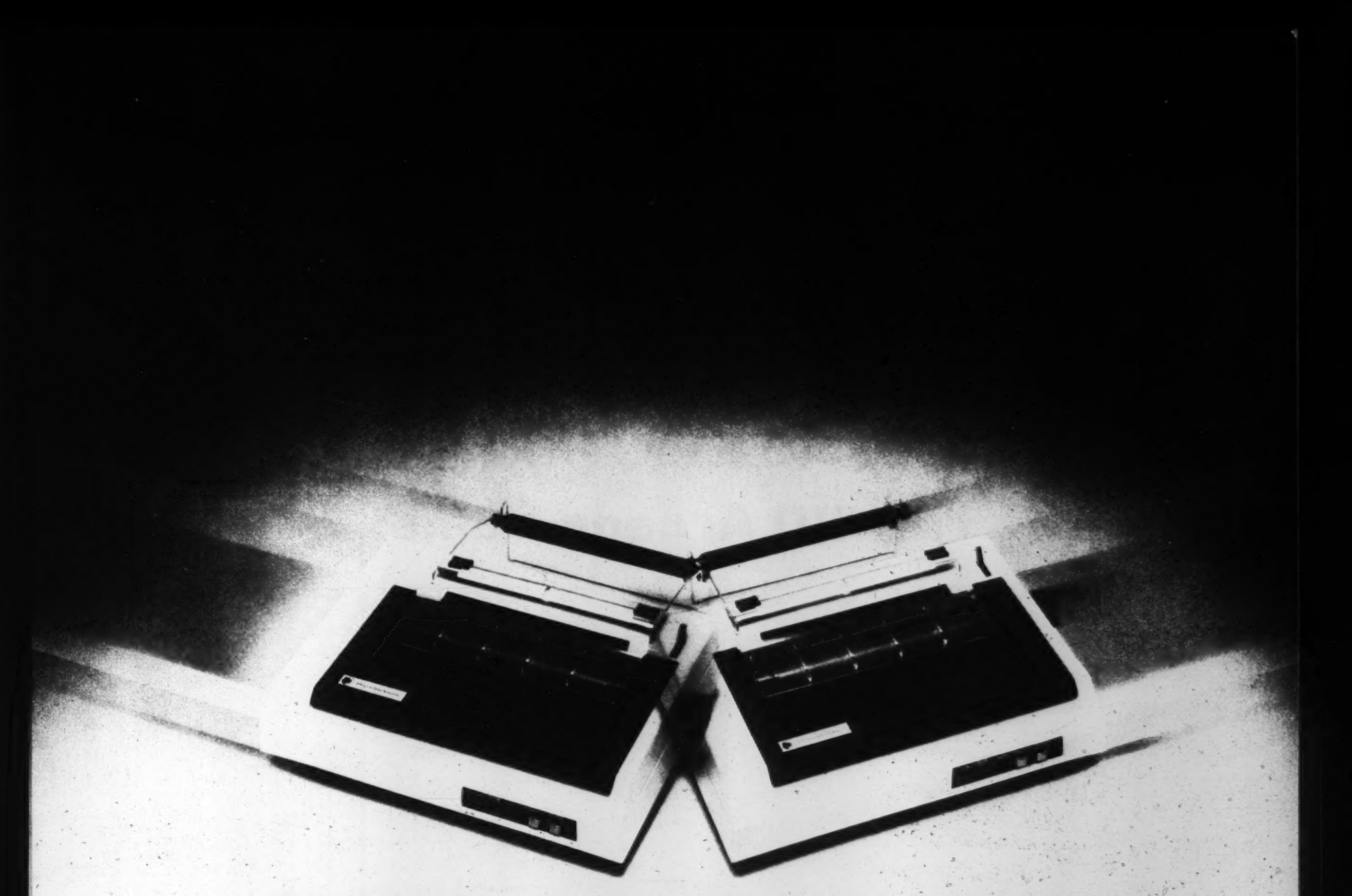
Kayos.

When you boot it up, you see a field of asteroids crossing space from left to right—a complex animation task for sure; someone worked very hard on it.

At blinding speed a series of blurry objects comes out of the top of the screen and dives upon your emplacement; I could never identify what they were, they went so fast. My average playing time was around a minute or two, and I just couldn't see spending too much time on the game.

Galaxians, and arcade games like it, are a challenge because they are not too fast. Much fiendish design effort went into making them just fast enough to be an agonizing challenge and not simply impossible. *Kayos* lacks this human engineering quality. It is a game sadly in need of a few strategically placed delay loops.

Look for a reissue soon, I hope. This could be a fun game if it were slowed to a playable speed. ☐



PRINTS LIKE A DAISY...COSTS LIKE A MATRIX.

Integral Data Systems introduces the only low-cost dot matrix printer on the market that features Maisey™ printing. Maisey printing is a technique that allows you to produce correspondence-quality text approaching that of more expensive daisy-wheel printers, but at much faster speeds.

How fast? With Microprism Printer's™ dual speed capability, you can output at 75cps in correspondence-quality and 110cps in high-speed data mode. And it also features sharp, high-density graphics in an 84 x 84 dpi format.

You'll get cleaner, crisper output than you ever thought possible in a single pass.

Other standard features of the Microprism include proportional spacing, text justification and, of course, software compatibility with our more expensive Prism Printer™ line.

The Microprism Printer is the perfect system mate that can handle all of your printing requirements . . . it's the best of both worlds. So if you've been waiting for the price of daisy-wheel printers to come down, or the quality of dot matrix to go up, now is the time to check out the exciting new Microprism Printer from Integral Data Systems.

Stop in at your local dealer today and ask for a demonstration. If you need the name of the dealer nearest you, call us toll-free at (800)258-1386. Or write Integral Data Systems, Milford, NH 03055.

MICROPRISM™

Integral Data Systems, Inc.

Microprism Printer, Prism Printer and Maisey are registered trademarks of Integral Data Systems, Milford, NH.

CIRCLE 181 ON READER SERVICE CARD

TRS-80 Arcade Games

Harry McCracken and Owen Linzmayer

Video game madness is sweeping America. News magazines publish cover stories on video games, bookstores sell books on how to beat them, and chart-topping records are recorded about them. It is not surprising, then, that many software publishers offer versions of the most popular arcade games for home computers.

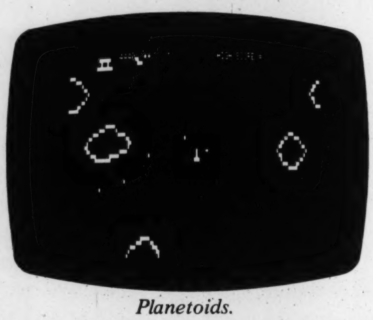
Not surprising, at least, in the case of such computers as the Apple II, Atari, and TRS-80 Color Computer. Those machines all have high-resolution color graphics, sound routines in ROM, and paddles or joysticks. Not so the TRS-80 Model I and Model III. They have low-resolution black and white displays, no sound routines, and no game controllers. That is why it is remarkable that there are quite a few good arcade-style games for the TRS-80 Model I and III.

Let's look at four games which make especially good use of the limited potential of the TRS-80 as an arcade game machine.

Planetoids

Planetoids, published by Adventure International, is, as the name suggests, inspired by the classic Atari arcade game Asteroids: you control a ship which shoots at floating asteroids and enemy spacecraft.

Adventure International has released versions of *Planetoids* for both the TRS-80 and the Apple II. Amazingly, the TRS-80 version is by far the better of the two.



Planetoids.

Greg Hassett, known primarily for his adventure games, has written one of the best arcade-style games available for any home computer with or without, high-resolution color graphics.

Many home computer games which try to simulate arcade games get the graphics of the original down, but *Planetoids* is one of the very few which do a good job of simulating the *timing* of the original. That means that playing *Planetoids* is much like playing Asteroids.

Planetoids is enhanced by its special features and playing modes. Like many games, it has more than one skill level, but it also has the option of saving high scores to tape, the ability to abort a game in progress, and the ability to "freeze" a game, so that you can answer the phone and come back to an uninterrupted game.

The special modes include "dogfight" mode, in which there are no asteroids and you fight one-on-one with the enemy ships; "cruise" mode, in which the asteroids move very, very slowly, so that you can practice steering your ship; and "practice" mode, in which game play starts out at a higher skill level than normal—*Planetoids*—gets harder as you

creative computing

SOFTWARE PROFILE

Name: Planetoids

Type: Arcade game

System: TRS-80 Model I and III, 16K

Format: Cassette

Summary: Excellent version of Asteroids

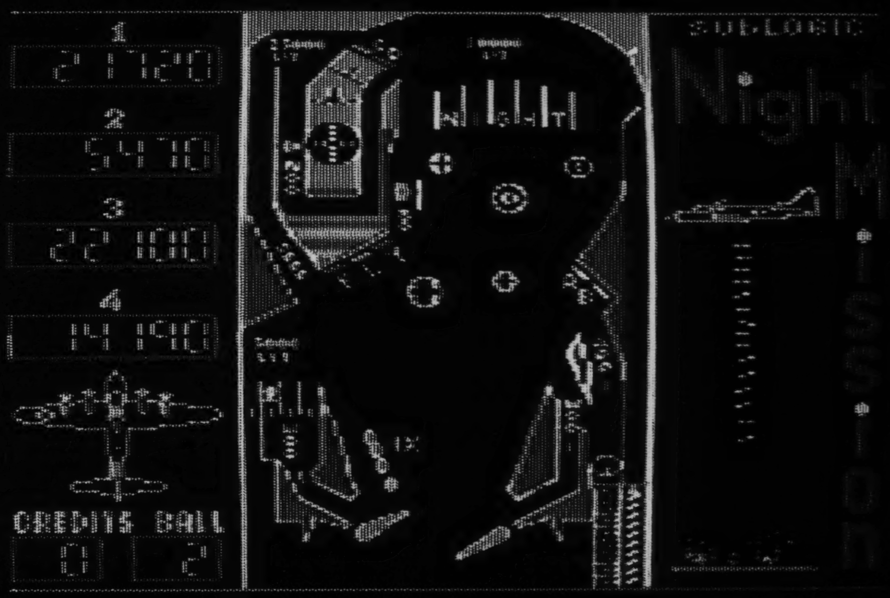
Price: $19.95

Manufacturer:

Adventure International
Box 3435
Longwood, FL 32750

Harry McCracken, 47 Carleton Street, Newton, MA 02158.

A2·PB1 PINBALL



Experience A2-PB1 PINBALL, the ultimate in arcade simulation. If you're already familiar with other pinball games, discover what a real pinball simulation is all about. 48K Apple II disk, $29.95

Features:

- **10 selectable modes of play, including *Easy, Competition, High Speed,* and *Cosmic.***
- **40 user-adjustable parameters: create and save your own custom games.**
- **an instruction card, a hi-score disk label, and a 16-page manual explaining all of the variations available.**

subLOGIC

Communications Corp.
713 Edgebrook Drive
Champaign IL 61820
(217) 359-8482
Telex: 206995

See your dealer . . . and see what you've been missing!

For direct orders, add $1.50 and specify UPS or first class mail. Illinois residents add 5% sales tax. Visa and MasterCard accepted.

"Apple" is the registered trademark of Apple Computer Inc.

CIRCLE 284 ON READER SERVICE CARD

YOUR PROGRAM HERE

IBM

The best software for the IBM Personal Computer. Could it be yours?

Attention, all programmers. Here's a chance to reach the top.

If you've written software that's completed and runs on the IBM Personal Computer, we could be interested in publishing it.

(We also could be interested if it runs on *another* computer. If we select your software, we'll ask you to adapt it to our system.)

But be advised.

Our expectations are great.

Because the software we publish must be good enough to complement IBM Personal Computer hardware. In fact, the more you take advantage of all our hardware capabilities (see the box at right), the more interested in your software we become.

Think about incorporating color graphics into your program, for example.

Use sound. Consider the power of our keyboard and remember to utilize the ten programmable function keys.

In all cases, we're interested in "friendly" software—with emphasis on quality and wide appeal. Programs with the greatest chance of being published must be easy to use, offer a better way to accomplish a task and provide something special to the user.

What kinds of programs? All kinds.

Education. Entertainment. Personal finance. Data management. Self improvement. Games. Communications. And yes, business.

We select programs that will make the IBM Personal Computer an even more useful tool for modern times.

IBM PERSONAL COMPUTER SPECIFICATIONS

User Memory
16K-256K bytes*
Microprocessor
16-bit, 8088*
Auxiliary Memory
2 optional internal diskette drives, 5¼" 160K bytes or 320K bytes per diskette
Keyboard
83 keys, 6 ft. cord attaches to system unit*
10 function keys*
10-key numeric pad
Tactile feedback*
Diagnostics
Power-on self testing*
Parity checking*

Display Screen
High-resolution*
80 characters x 25 lines
Upper and lower case
Green phosphor screen*
Operating Systems
DOS, UCSD-p System, CP/M-86†
Languages
BASIC, Pascal, FORTRAN, MACRO Assembler, COBOL
Printer
Bidirectional*
80 characters/second
12 character styles, up to 132 characters/line*
9 x 9 character matrix*

Permanent Memory
(ROM) 40K bytes*
Color/Graphics
Text mode:
16 colors*
256 characters and symbols in ROM*
Graphics mode:
4-color resolution: 320h x 200v*
Black & white resolution: 640h x 200v*
Simultaneous graphics & text capability*
Communications
RS-232-C interface
Asynchronous (start/stop) protocol
Up to 9600 bits per second

***ADVANCED FEATURES FOR PERSONAL COMPUTERS**

So, if you think your software is the best, consider submitting it. If it's accepted, we'll take care of the publishing, the marketing and the distribution. All you have to do is reap the benefits of our new royalty terms. And you're free to market your program elsewhere *at any time* even if you license it to us.

We're offering the ladder. Think about taking the first step.

For information on how to submit your program, write: IBM Personal Computer,
External Submissions,
Dept. 765 PC, Armonk,
New York 10504.

IBM®

The IBM Personal Computer A tool for modern times

For an authorized IBM Personal Computer dealer near you (or information from IBM about quantity purchases) call 800-447-4700. In Illinois, 800-322-4400. In Alaska or Hawaii, 800-447-0890.

†UCSD p-System is a trademark of the Regents of the University of California. CP/M-86 is a trademark of Digital Research, Inc.

CIRCLE 177 ON READER SERVICE CARD

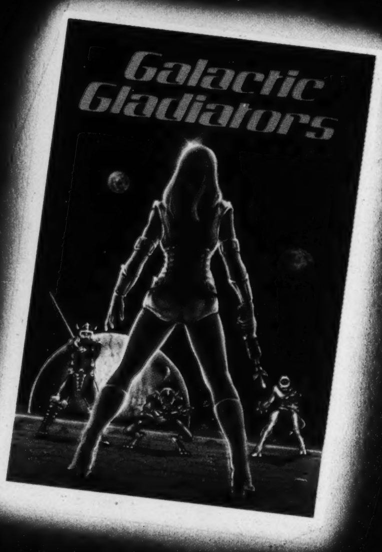
THE LINE IS RAPIDFIRE.
THE GAME IS....
CYTRON MASTERS
RapidFire

SIZZLING

HOT &

COMING

AT YOU!


Galactic Gladiators

RapidFire

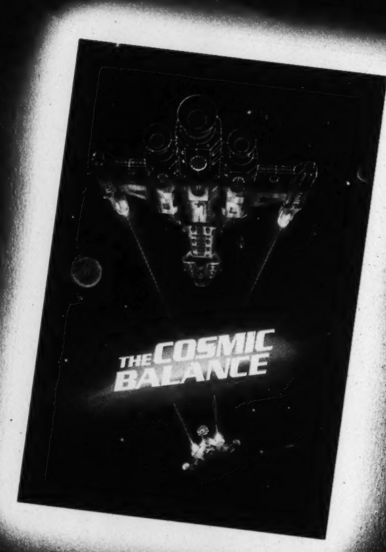
GAMES FROM SSI

FUN.

FAST.

POWERFUL.

EXCITING.


THE COSMIC BALANCE

LOOK FOR THEM AT YOUR LOCAL COMPUTER/GAME STORE!

If there are no convenient stores near you, VISA and M/C holders can order by calling 800-227-1617, ext. 335 (toll free). In California, call 800-772-3545, ext. 335. To order by mail, send your check to: Strategic Simulations Inc, 465 Fairchild Drive, Suite 108, Mountain View, CA 94043. (California residents, add 6.5% sales tax.) Each game is $39.95.

CIRCLE 281 ON READER SERVICE CARD

play—and your score is not recorded on the high score chart.

All of these features ensure that *Planetoids* will hold your interest for a long time.

I do have two small complaints about the game. It does not have sound, and there is no two-player mode. Neither of these is a big problem, but the game would be better if it had sound and two-player capability, as most TRS-80 arcade games do.

Alien Defense

Another game which does a good job of adapting an arcade game to the TRS-80 is *Alien Defense* from Soft Sector Marketing. Inspired by Williams's arcade hit *Defender*, it is probably the most difficult arcade game around for the TRS-80.

As in *Defender*, you control a ship which flies above a horizontally scrolling landscape and shoot down many kinds of aliens, some of which fly down and kidnap people who stand on the landscape.

The graphics in this game aren't as good as those in *Planetoids*; they flicker and the movement is a bit too jerky. That isn't surprising, though; there is a great deal of movement going on in this game.

creative computing

SOFTWARE PROFILE

Name: Alien Defense

Type: Arcade game

System: TRS-80 Model I and III
16K cassette, 32K disk

Format: Cassette or disk

Summary: Good version of Defender

Price: $19.95 cassette; $24.95 disk

Manufacturer:

Soft Sector Marketing
6250 Middlebelt
Garden City, MI 48135

Larry Ashmun, the author of *Alien Defense*, has done a good job of putting the ship controls onto the TRS-80 keyboard. While you must manipulate six keys to control your ship, the pattern in which the keys are arranged makes it easy to do.

The Model III version of *Alien Defense* has an added feature: the special character set of that computer is used, so that the little men look like men, and the alien ships look more like alien ships than they do on the Model I. This is the only Model III game I know of which uses the Model III graphics so well.

All in all, *Defender* fans should be very pleased with *Alien Defense*. Like *Defender*, it is a very challenging game, so beginning arcade game players might find it a bit complicated at first.

Defense Command

creative computing

SOFTWARE PROFILE

Name: Defense Command

Type: Arcade game

System: TRS-80 Model I and III,
16K cassette, 32K disk

Format: Cassette or disk

Summary: Big Five's best yet

Price: $15.95 cassette; $19.95 disk

Manufacturer:

Big Five Software
Box 9078-185
Van Nuys, CA 91409

Big Five Software has released a steady stream of superb games, over the last couple of years. One of their most recent games, *Defense Command*, is their best yet. It might be described as *Space Invaders* crossed with *Defender*. You control a base at the bottom of the screen, *Space Invaders* style, and protect fuel cells from attacking aliens who try to steal them.

Just about everything which has distinguished Big Five games in the past is in *Defense Command*. Explosions are more realistic; the high score chart lets you type in your full name, rather than just a few characters; and the infamous Big Five Flagship is more evil than ever. Like *Robot Attack*, *Defense Command* talks through the tape port, but the speech is far clearer.

While *Defense Command* is a difficult game to master, it is not complicated; beginners may play terribly, but they will understand and enjoy the game. And because *Defense Command* requires more true strategy to master than the other Big Five games, even advanced arcade game enthusiasts will find it a challenge.

If you have trouble formulating a strategy to play the game well, watch the demonstration mode; the computer plays the game very well, and it is easy to pick up pointers from watching it play itself.

Armored Patrol

In writing a TRS-80 version of an arcade game the biggest problem is usually the creation of an acceptable graphics display. This is a difficult task with almost any hi-res game (what current arcade game isn't hi-res?) but, when a TRS-80 version of a vector graphics game is desired, it borders on the impossible—or so I thought. *Armored Patrol* is an adaption of the popular arcade game Battlezone, which uses vector graphics.

Written by Wayne Westmoreland and Terry Gilman, *Armored Patrol* is an amazing demonstration of how far creative programming can stretch the limited graphics capabilities of the TRS-80. In *Armored Patrol* the player assumes the guise of a tank commander positioned in a desolate battlezone. This death field is littered with indestructible blockhouses which serve as obstacles during a shoot out. Hidden in this barren land is an endless supply of enemy tanks and killer robots bent on destroying the player.

creative computing

SOFTWARE PROFILE

Name: Armored Patrol

Type: Arcade simulation

System: 16K Model I or III TRS-80

Format: Cassette

Language: Machine

Summary: Superb arcade game

Price: $19.95

Manufacturer:

Adventure International
Box 3455
Longwood, FL 32750

Armored Patrol allows one or two players, alternating turns, to test their abilities against the enemy forces. The program constantly displays and updates the players' scores and also keeps track of the high-score. The sound effects are an added touch to enhance the captivating 3-D screen display.

Never before had I imagined that my TRS-80 was capable of such a realistic simulation.

The object of this game is survival. By weaving skillfully among the blockhouses, the player tries to gain position from

28K Commodore VIC Personal Computer (60% more powerful than VIC-20) **$299**

FOR THE SPECIAL SALE PRICE of $299.00, you get the Commodore VIC-20 computer, plus we add 60% more programming power. This powerful full sized extra featured computer includes the 6502 microprocessor (LIKE APPLE), 20,000 bytes ROM with a 16K extended microsoft LEVEL 11 BASIC, 8000 bytes user RAM, plug in expandable to 32K RAM, 66 key typewriter professional keyboard with graphic symbols on keys, 16 colors with command keys, sound and music, real time, upper/lower case, full screen editing cursor, floating point decimal and trig functions, has high resolution graphics, 512 displayable characters, test display is 23 lines, 22 characters, will accept TAPE-DISK-PLUG IN CARTRIDGES. We have great games and many other programs. It has low cost, direct plug in peripherals, does not require an expensive interface board for modems, printers or floppy disks, connects to any TV, includes AC adapter, RF modulator, switch box, self teaching instruction book.

90 DAY IMMEDIATE REPLACEMENT WARRANTY! Comes in a beautiful console case for only $299. (You can get a 41K COMMODORE VIC for $379). We stock more VIC-20 programs than anyone!— WRITE FOR FREE CATALOG!

15 DAY FREE TRIAL Return within 15 days complete and undamaged for refund of purchase price.

DON'T MISS THIS FANTASTIC SALE!! Phone 312/382-5244 to order and get delivery in 2 to 7 days, or send a certified check, money order or personal check to **PROTECTO ENTERPRIZES, BOX 550, BARRINGTON, ILLINOIS 60010.** We honor Visa and Master Charge, Ship C.O.D. Add $10.00 for shipping, handling and insurance. Illinois residents add 6% tax.

CIRCLE 247 ON READER SERVICE CARD

Put your business forms on an Apple II™

An innovative software system that speeds the processing and analysis of common business forms on a personal computer. VersaForm applications include:

- Invoicing
- Purchase orders
- Client billing
- Mailing lists
- Order processing
- Sales analysis
- Personnel records
- Inventory records

Hard Disk Versions Available

Apple III VERSIONS NOW AVAILABLE

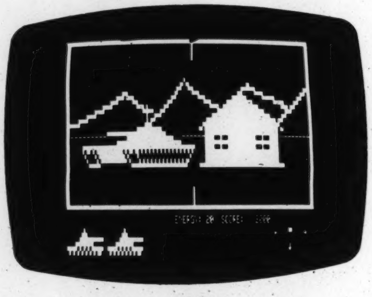
VersaForm™
Business Form Processor

Applied Software Technology
14125 Capri Drive
Los Gatos, California 95030
(408) 370-2662

CIRCLE 111 ON READER SERVICE CARD

which he can safely blast the enemy without risking destruction himself.

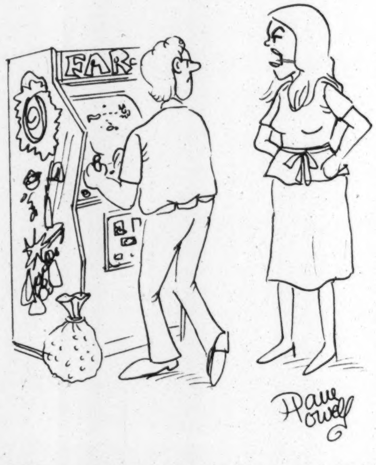
An enemy tank can combine forces with a killer robot to attack simultaneously from different vantage points. The player is aided by a radar scope that gives him a rough idea where the enemy is in relation to his position, but visual confirmation is usually required for accurate shooting.



Armored Patrol.

As the enemy tank approaches it grows in size and its surface details become clearer right up to the point where you are looking down the cannon barrel. By then it is usually too late to do anything but pray.

Armored Patrol is a classic in every sense of the word. Its value as a simulation is tremendous but it is also a superb arcade game. Although the controls are a bit difficult to master, it is a wonderful program for game players with even modest coordination. I recommend this package without reservation.—*O.W.L.*



"When a man starts asking for his paycheck in quarters, he's spending too much money on video games!..."

800-SOFTWARE

WORDSTAR™ $249 For IBM/PC

dBASE II™ $495

SuperCalc™ $199

Perfect Writer™ $249

CHECK OUT ALL OUR INCREDIBLE BUSINESS CP/M ® PRICES.

MICROPRO™	For Apple	For CP/M
*WordStar	$199	$249
Wordstar/MailMerge	$259	$309
*MailMerge	$ 69	$ 79
CalcStar	$119	$199
DataStar	$169	$199
SpellStar	$119	$169
Supersort	$119	$169

PERFECT SOFTWARE™	
*Perfect Writer	$249
*Perfect Speller	$129
*Perfect Filer	$189
TCS ACCOUNTING™	
General Ledger	$ 99
Accounts Payable	$ 99
Accounts Receivable	$ 99
Payroll	$ 99
All four above	$249
Inventory Management	$ 99
TRSDOS Accounting Package	$199
ASHTON-TATE™	
dBASE II	$495
SORCIM™	
*SuperCalc	$199
***SPELLGUARD™**	$179
SMARTERM™	$ 49
ARTIFICIAL INTELLIGENCE™	
Medical Billing	$495
Dental Billing	$495
CBASIC™	$ 99
***SELECT™** "The Word Processor"	$395
MICROSOFT™	
Softcard	$289
Videoterm (Videx™)	$279
Ram Card	$169
All three above	$579
MBASIC	$279
FOX AND GELLER™	
Quickcode	$239
CONDOR I™ (Data Base)	$209
THE WORD PLUS™	$129
IUS™	
*Easywriter II	$269
*Easyspeller	$139
ISI	
**T.I.M.	$349

*These programs are also available for IBM ®/PC.

Price includes manuals.

**Only for IBM ®/PC.

THE 800-SOFTWARE PROMISE.

We are dedicated to providing the finest software at the lowest possible price. Plus the personal service you expect and deserve. Count on us for:

The lowest prices anywhere. High volume selling makes it possible.

Fast delivery. We process every order the same day we get it.

Giant inventory. Everything's in stock so you don't have to wait.

Technical support. We back up what we sell.

Specialist expertise. We are the business CP/M ® software experts and can serve you better. Let us prove it.

Pick up the phone and pick up a bargain.

VISA MasterCard AMERICAN EXPRESS

TO ORDER, CALL TOLL-FREE:

800-227-4587

In California 800-622-0678

CA residents add sales tax.

OR WRITE:

800-SOFTWARE, INC.

185 Berry Street, Suite 6820, San Francisco, CA 94107

☐ Purchase orders accepted.
☐ Prompt UPS 3 day Blue Label service.
☐ Call for shipping charges.

CIRCLE 161 ON READER SERVICE CARD

The Puzzle Of The Tacoma Narrows Bridge Collapse: An Interactive Videodisc Program For Physics Instruction

Dean Zollman and Robert Fuller

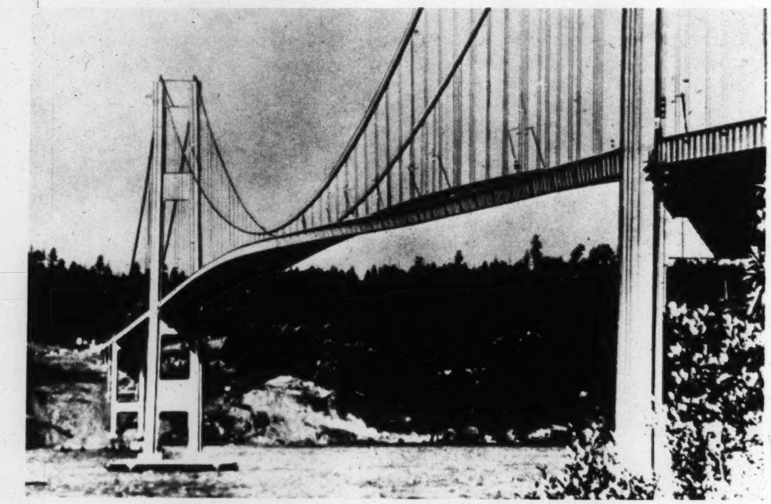
On November 7, 1940 the bridge across the Tacoma Narrows went into violent oscillations and collapsed within a few hours (Figures 1-3). Most of the final hours of the bridge and many earlier oscillations were photographed on 16mm color film by Barney Elliott, proprietor of The Camera Shop in Tacoma, WA.

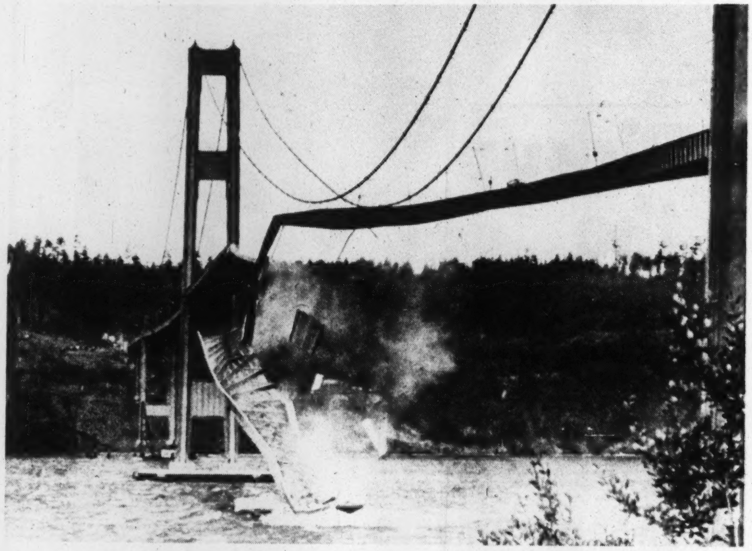
The films of the bridge undergoing oscillations with amplitudes of over two meters can motivate almost any student to learn more about wave motion. Several years ago one of our students paid the ultimate compliment to a short edited version of the original film: "I'd even pay to see that."

Thus, while this event was a disaster in terms of cost and hurt pride to engineers, it has provided physics teachers with the most captivating demonstration of wave phenomena ever devised. Certainly, physics teachers have long applauded the designing engineers for their contributions to physics instruction and Barney Elliot for filming it.

The quality and uniqueness of the Tacoma Narrows Bridge film make it very valuable for audio-visual presentations. When we and Thomas Campbell of Illinois Central College began thinking about subjects for our first interactive videodisc, the Tacoma Narrows Bridge and the reasons for its collapse were natural choices.

Further, several good physics films on wave motion and vibrations are available. By using them and Mr. Elliot's film we believed we could create a low-cost instructional videodisc. Thus, we proposed to the National Science Foundation (NSF) Directorate for Science Education that it support us in this low-cost approach to videodisc education. The NSF agreed to provide funds, so we began planning in early fall, 1979.





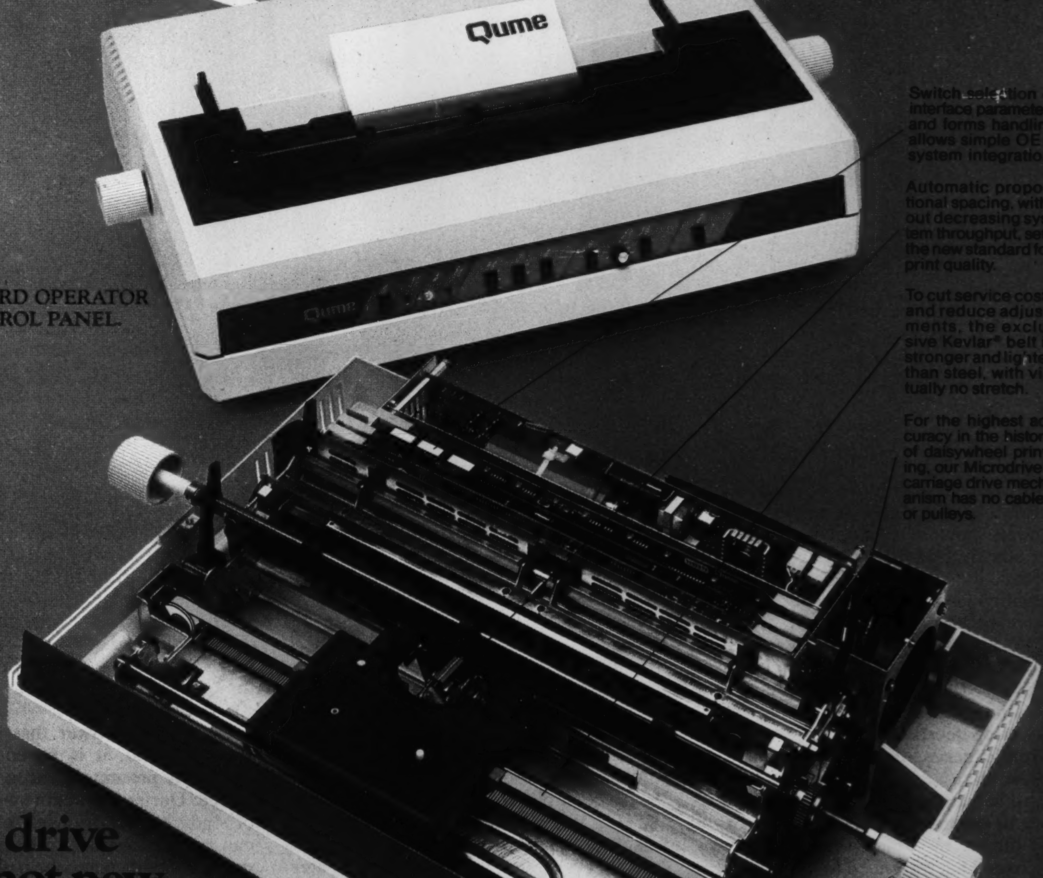
Dean Zollman, Department of Physics, Kansas State University, Manhattan, KS 66506.

Robert G. Fuller, Department of Physics, University of Nebraska-Lincoln, Lincoln, NE 68588.

QUME

SPECIAL SALE
SPRINT 9/45!
Call Qume for details.

SPRINT 9



Switch selection of interface parameters and forms handling allows simple OEM system integration.

Automatic proportional spacing, without decreasing system throughput, sets the new standard for print quality.

To cut service costs and reduce adjustments, the exclusive Kevlar® belt is stronger and lighter than steel, with virtually no stretch.

For the highest accuracy in the history of daisywheel printing, our Microdrive™ carriage drive mechanism has no cables or pulleys.

STANDARD OPERATOR
CONTROL PANEL.

LIMITED OEM
CONTROL PANEL.

Test drive our hot new daisywheelers.

If you've always wanted letter-quality printing from your DP system but the cost has put you off, then a SPRINT 9 is for you. Now you can have the same high quality print—usually only available on word processing systems—at prices that will let you forget all about dot-matrix terminals. With speeds of 45 and 55 cps (average English text, not burst rate), the reliable high performance of SPRINT 9 terminals leaves the crowd behind. Prove it to yourself with a test drive. Call or write Qume at (408) 942-4000. 2350 Qume Drive, San Jose, California 95131.

Qume.
A Subsidiary of ITT

CIRCLE 252 ON READER SERVICE CARD

The Bridge Disc

The Puzzle Of The Tacoma Narrows Bridge Collapse was created as a Level Two videodisc (see box) and is designed for use with a Pioneer PR-7820 videodisc player. Any student who learns physics by using the disc must interact frequently via the remote keypad.

This interaction takes the form of answering questions or making choices which are presented on the television screen. The degree to which the student is active during the lesson can be described in terms of its length. If played from beginning to end as one would a motion picture, the program lasts for slightly less than 27 minutes. When taking part in an interactive lesson, students spend from two to four hours using the system.

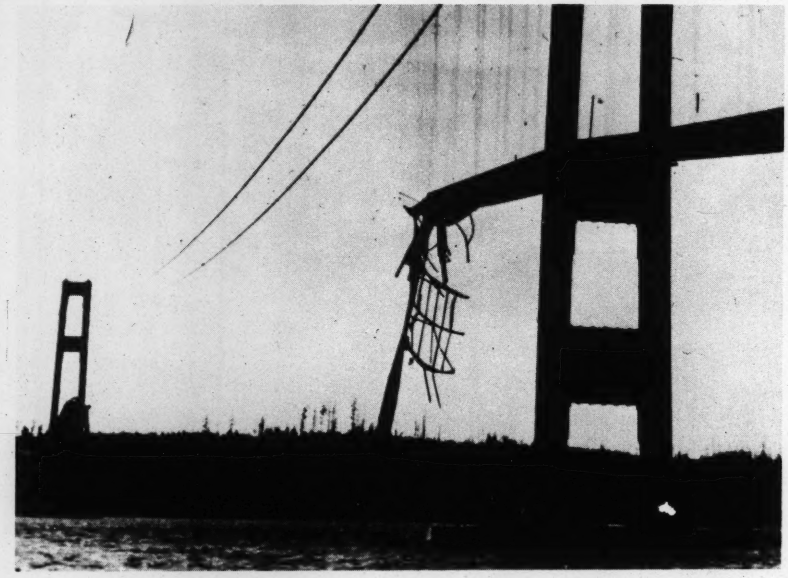
By using the programming capabilities of the player, parts of the program can be made available to some students but not others. We used this aspect of the technology to establish three levels of physics instruction.

These levels are labelled red, blue and green and correspond to the three major types of introductory physics courses—physics for the nonscience student, physics presented using algebra and physics using calculus. At various points during the lesson students branch to frames which depend on their level.

As we developed the disc we were guided by some basic principles. First, students should have a strong motivation to study the subject matter on the disc. Second, the physics involved should be presented as a problem or puzzle for the students to solve. They, not we, should be the ones to state "The bridge collapsed because..."

Finally, the interaction between disc and student should be much more than answering questions. By viewing pictures of real experiments they should be able to take data and draw conclusions from them. In summary, the lesson on the disc must be theirs not ours. While we provide the means by which they learn, they discover what they need to know to solve the problem.

With these thoughts in mind we divided The Puzzle Of The Tacoma Narrows Bridge Collapse into five parts: Introduction to the Player, The Bridge Collapse, The Influence of the Wind, The Importance of the Bridge Properties, and Conclusion. Perhaps the best way to see how students work with the disc is to take a guided tour of each part.



Introduction To The Player

We assume that students would not previously have used an interactive videodisc player, so our first step is to teach them how to use the system. They are guided through a series of operations each of which teaches how to use a key or series of keys needed to interact with the disc.

The presentation requires action on the part of the student; the picture does not change, for example, unless he presses the appropriate key. By the time the student has finished this short section he has demonstrated sufficient knowledge of the system to complete the lesson.

The Hook

When the student reaches the end of the introduction to the player he is told to enter the number 49, then press RECALL SEARCH. These entries on the keypad recall from memory the frame number stored in memory location 49, then cause the machine to search to that frame.

The next picture states PRESS AUTOSTOP. When this key is pressed, the machine plays to the frame stored in the memory location which is one greater than the last one used. (In this case the disc plays to the frame stored in memory location 50.) This series of entries begins the physics lesson.

We have informally named this section of the disc "the hook" because it is used to pique the student's curiosity about the Tacoma Narrows Bridge and its collapse. It "hooks" or intrinsically motivates him to complete the study of standing waves which is recorded on the disc.

Here the student views the construction, initial oscillations, violent oscillations and collapse of the first Tacoma Narrows Bridge. Accompanying the video is an audio narration created from written accounts of Professor F. B. Fahquarson, a consulting engineer, Kenneth Arkin, chairman of the Tacoma Narrows Bridge Authority; and Leonard Coatsworth, a reporter for the Tacoma News-Tribune and the last person to drive onto the bridge.

We feel that this seven-minute sequence will hook even the least interested student into wanting to learn more about the reasons for the bridge collapse.

After the bridge has collapsed and Mr. Coatsworth has lamented the loss of his daughter's dog Tubby (the only casualty), the videodisc stops on a frame containing the question "Why did the Tacoma Narrows Bridge Collapse?"

We do not answer that question directly. Instead, it is posed so that the student is presented with a puzzle to be solved. During the next two to four hours of study he will discover the pieces that can be put together to help explain this disaster. With some help from a video disc he will solve the puzzle of the Tacoma Narrows Bridge collapse.

The Influence Of The Wind

So far in the lesson the student has been rather passive. He has watched the bridge collapse but has done little else. That situation changes quickly.

To learn about the influence of the wind on the bridge collapse the student must take control of a series of experiments. The experiments involve a model of the bridge, a fan and a piece of cardboard. The fan blows on the bridge with three different speeds. In addition to a constant push, winds can blow in such a

THE LIBRARY OF COMPUTER AND INFORMATION SCIENCES

Please accept my application for trial membership and send me the PERSONAL COMPUTING LIBRARY (10522) billing me only $2.95. I agree to purchase at least three additional Selections or Alternates over the next 12 months. Savings range up to 30% and occasionally even more. My membership is cancelable any time after I buy these three books. A shipping and handling charge is added to all shipments.

No-Risk Guarantee: If you are not satisfied —for any reason—you may return the PERSONAL COMPUTING LIBRARY within 10 days and your membership will be canceled and you will owe nothing.

Name____________________________

Name of firm________________________
(if you want subscription sent to your office)

Address__________________________

City_____________________________

State______________Zip____________
(Offer good in Continental U.S. and Canada only. Prices slightly higher in Canada.)

Creative Computing 10/82 7-BM4

THE LIBRARY OF COMPUTER AND INFORMATION SCIENCES

Please accept my application for trial membership and send me the PERSONAL COMPUTING LIBRARY (10522) billing me only $2.95. I agree to purchase at least three additional Selections or Alternates over the next 12 months. Savings range up to 30% and occasionally even more. My membership is cancelable any time after I buy these three books. A shipping and handling charge is added to all shipments.

No-Risk Guarantee: If you are not satisfied —for any reason—you may return the PERSONAL COMPUTING LIBRARY within 10 days and your membership will be canceled and you will owe nothing.

Name____________________________

Name of firm________________________
(if you want subscription sent to your office)

Address__________________________

City_____________________________

State______________Zip____________
(Offer good in Continental U.S. and Canada only. Prices slightly higher in Canada.)

Creative Computing 10/82 7-BE5

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 230 RIVERSIDE, N J

POSTAGE WILL BE PAID BY ADDRESSEE

THE LIBRARY OF COMPUTER
AND INFORMATION SCIENCES
Riverside, New Jersey 08075

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 230 RIVERSIDE, N J

POSTAGE WILL BE PAID BY ADDRESSEE

THE LIBRARY OF COMPUTER
AND INFORMATION SCIENCES
Riverside, New Jersey 08075

Microprocessors and Microcomputer Systems
Guthikonda V. Rao
Circuit Cellar
BY STEVE CIARCIA
Ciarcia's Circuit Cellar
Control the World!
(Or at Least a Few Analog Points)

TAKE THE 3-VOLUME PERSONAL COMPUTING LIBRARY FOR ONLY $2.95

when you join **THE LIBRARY OF COMPUTER AND INFORMATION SCIENCES**

You simply agree to buy 3 more books—at handsome discounts—within the next 12 months.

Enjoy the challenge and reap the benefits of microcomputing with the Personal Computing Library. This set of three carefully-selected books—a $57.45 value—provides you with hours of thought-provoking computer projects. For only $2.95—it's a value you can't afford to pass up.

Take a look at the three books you'll get!

MICROPROCESSORS AND MICROCOMPUTER SYSTEMS.

Second Edition. Guthikonda V. Rao. A comprehensive guide to the latest developments in microcomputer technology, including LSI/VLSI microcomputers and microprocessors, and their current applications, plus hardware, software, and firmware. Numerous reference charts and illustrations. Wide ranging coverage includes: various off the shelf chips, personal computing, video games, small business programs, display system data. Nearly 600 pages of information.

Publisher's Price $36.50

CIARCIA'S CIRCUIT CELLAR: Volumes I and II.

The two softbound volumes provide... a complete tutorial to the construction of over 30 microcomputer projects.

Volume I includes:

- how to build a dual voltage converter, and various methods to help you achieve voltage multiplication
- classical I/O decoding and memory mapped methods
- how to construct an 8 channel 3½ digit DC digital voltmeter interface

Volume II includes:

- how to build a computer controlled security system for your home
- a design for a computer controlled wood stove
- how to add nonvolatile memory to your computer

Publisher's Price $20.95.

The Library of Computer and Information Sciences is the oldest and largest book club especially designed for the computer professional. In the incredibly fast-moving world of data processing, where up-to-date knowledge is essential, we make it easy for you to keep totally informed on all areas of the information sciences. In addition, books are offered at discounts up to 30% off publishers' prices.

Begin enjoying the club's benefits today!

4 Good Reasons to Join

1. The Finest Books. Of the hundreds of books submitted to us each year, only the very finest are selected and offered. Moreover, our books are always of equal quality to publishers' editions, *never* economy editions.

2. Big Savings. In addition to getting the Personal Computing Library for $2.95 when you join, you keep saving substantially—up to 30% and occasionally even more. (For example, your total savings as a trial member—including this introductory offer—can easily be over 50%. That's like getting every other book free!).

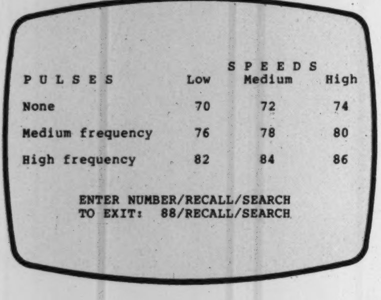
3. Bonus Books. Also, you will immediately become eligible to participate in our Bonus Book Plan, with savings up to 70% off the publishers' prices.

4. Convenient Service. At 3-4 week intervals (16 times per year) you will receive the Book Club News, describing the Main Selection and Alternate Selections, together with a dated reply card. If you want the Main Selection do nothing and it will be sent to you automatically. If you prefer another selection, or no book at all, simply indicate your choice on the card, and return it by the date specified. You will have at least 10 days to decide. If, because of late mail delivery of the News, you should receive a book you do not want, we guarantee return postage.

If reply card has been removed, please write: **The Library of Computer and Information Sciences.** Dept. 7-BE5, Riverside, N.J. 08075, to obtain membership information and application.

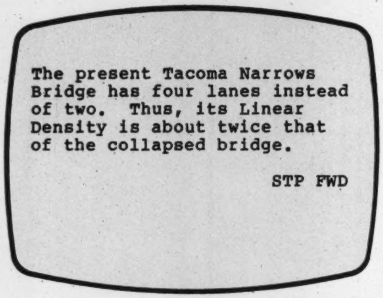
way as to create a pulsating force on bridges.

In this experiment the pulsations are created by periodically placing the cardboard in front of the fan. The fan can be set to three different speeds. The pulsing action results in no pulses, low frequency pulses, and high frequency pulses. With three values for each of two variables, nine different experiments exist. Each of these experiments has been recorded on the videodisc.



```
                              S P E E D S
P U L S E S            Low      Medium      High

None                    70        72          74

Medium frequency        76        78          80

High frequency          82        84          86

           ENTER NUMBER/RECALL/SEARCH
           TO EXIT:  88/RECALL/SEARCH
```

The student is introduced to the experiments and told that he must use them to determine what aspect of the wind was important in the collapse. Then a choice matrix (Figure 4) appears on the screen.

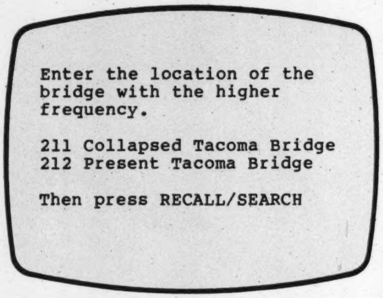


```
The present Tacoma Narrows
Bridge has four lanes instead
of two.  Thus, its Linear
Density is about twice that
of the collapsed bridge.

                        STP FWD
```

By pressing appropriate keys the student may select the experiments he wishes to see.

When he decides he has seen enough, he may end the experiment and move on. But, he cannot go far until he has been tested on his conclusions. A series of multiple choice questions query him about the influence of the wind. Incorrect answers cause the machine to show the experiments again. The student is stuck until he reaches the conclusion that the rate of pulsation, not the speed of wind, is the critical factor.

The Bridge Properties



```
Enter the location of the
bridge with the higher
frequency.

211 Collapsed Tacoma Bridge
212 Present Tacoma Bridge

Then press RECALL/SEARCH
```

Pulsating forces arising from wind cause most bridges to vibrate, but the first Tacoma Narrows Bridge fell down. To understand the difference between this bridge and most others, the student moves on to investigate the properties of vibrations in general and of vibrating bridges in particular.

To complete the investigation the student must have some knowledge of the physics of waves and oscillations. He learns this through a series of short presentations which rely heavily on a computer animated film created by Encyclopedia Brittanica Education Corporation with the assistance of Professor Albert Baez.

These sequences, which require some interaction by the student, lead up to a

Capabilities Of The Optical Videodisc

This optical videodisc system offers a new level of capability to the instructional designer. Each side of a disc can contain about 50,000 individual pictures (usually called frames). These frames can be shown one at a time for as long as needed; they can be played at regular speed (30 frames per second) to show normal motion; or they can be played at any slow motion speed forward or backward.

At normal playing speed the videodisc can play one or both of two audio channels. The audio capabilities allow for stereo sound, bilingual education, or different narratives for students with different backgrounds. While all of these features are useful, they would be of limited value without random access.

In a very short time an optical videodisc player can select and play any frame on the disc. For a well-constructed disc the search time is less than a second. For the worst possible situation, a search from frame one to frame 50,000, the access time varies from a few seconds for the educational-industrial models to about twenty seconds for a consumer player.

An interactive videodisc can be created at several different levels of instruction. At Level One the disc is designed for use on a stand-alone consumer model player such as the Pioneer VP-1000. Most discs at this level are motion pictures which play from beginning to end without any interaction. However, consumer players such as the Pioneer VP-1000 and VP-1100 have all the capabilities described above. Interactive discs can be and have been created for it. Perhaps, the best and most interactive to date is The First National Kidisc produced by Bruce Seth Green. (A review of this disc appears in the January, 1982, issue of *Creative Computing*).

A Level Two disc requires a small microprocessor such as the ones built into the Pioneer PR-7820 (formerly called the DiscoVision PR-7820) and the Sony LDP-1000. These players have internal memories which allow the instructor to enter program steps or to load the numbers of significant frames. While the various players have slightly different capabilities, they are all approximately equivalent to a 1K microcomputer.

Generally, a digital program is placed on the second audio track at the beginning of the disc. This program is loaded into the memory of the system and controls the operation of the disc. To date large numbers of videodiscs at this level of interaction have been created by General Motors and Ford. Many auto showrooms have stand-alone players with keypads for interaction. The Puzzle Of The Tacoma Narrows Bridge Collapse is designed for this type of interaction.

The third level involves coupling the videodisc player to an external computer. At present the most frequently used computers are the personal variety. All Pioneer players and the Sony are capable of receiving information from a computer. Thus, highly interactive lessons using all the advantages of both systems are now available.

The economics lesson developed by the Minnesota Educational Computing Consortium and described in the January, 1982 issue of *Creative Computing* is an example of this type of disc. A Level One disc can also be converted to a Level Three disc as was demonstrated by the computer-video adventure game published in the same issue of *Creative Computing—D.Z.*

INTRODUCING

SAVVY™

... the PERSONAL LANGUAGE™ system that mirrors your commands using your own words!

What SAVVY is —

- SAVVY is a miraculous new information handling system.
- SAVVY is an automatic database management system.
- SAVVY is a new level of machine intelligence.
- SAVVY, part hardware, part software, is the beginning of truly "Personal Computing".

What SAVVY does —

Through SAVVY, you and your computer talk to each other in your own natural, conversational English (or Spanish, or French, etc.).

It learns from you what you want done in your own personal language.

Once SAVVY learns your language it can create any file you wish. Input, output, additions, changes and deletions are arranged for you.

SAVVY's "Robot Programmer" has been trained to write 100% of the programs needed to manage your database information.

SAVVY runs on CP/M™ and Apple DOS.

SAVVY
PERSONAL LANGUAGE
SAVVY

What YOU discover —

You'll discover that SAVVY recognizes your personal words, even if misspelled, or even if you use a phrase never used before!

SAVVY continues to grow through use to become better and better at understanding your commands.

Eventually, you will see SAVVY as a mirror to your own way of thinking and working. It is a re-definition of "user-friendly".

SAVVY, it's the first system that truly means "personal computing".

SAVVY is like no other system on earth.

SAVVY cost $950.

Seeing is believing. SAVVY is on display at selected computer retail locations. Call for the name of your nearest dealer.

Trademark: SAVVY, Robot Programmer: Excalibur Technologies Corporation.

Personal Language: SAVVY Marketing International.

CP/M is a trademark of Digital Research Corp.

Apple is a Trademark of Apple Computer Inc.

CIRCLE 260 ON READER SERVICE CARD

100 South Ellsworth Street, 9th Floor, San Mateo, CA 94401 (415) 340-0335

SAVVY
MARKETING INTERNATIONAL

Welcome to the world of
User/Friendly Computing

Software should be easy to use, easy to understand and forgiving when the user makes an incorrect entry.

You don't have to know how to use a computer to use Micro Lab products. The programs are designed to be **error-trapped** and made to get the job done.

Wall Streeter
This portfolio management program allows you to enter, by hand or modem, Friday's closing prices, Standard and Poor, Beta ratings, Value line timeliness and safety factors. Use standard formula or make up your own to project buys, sells and holds.

Asset Manager
Both old and new tax laws are incorporated in this program which uses the straight line method for balance sheets and accelerated method for establishing asset values for amortization and prints tax schedules. 1,000 assets per taxpayer.

The Data Factory
An extremely easy-to-use system with enormous power and flexibility. Data storage on two disks is 225,000 bytes. Relocate records into a new data base; add, delete, or change field lengths anytime.

V Factory
Allows for a marriage between Data Factory and VisiCalc™ files. You can move data in either direction, manipulate it within the chosen program, and store it either way. An exciting tool for research and analysis.

Relocatable Linking Loade
Takes machine language routines that have been designated by an assembler as relocatable, links them together, and then establishes the program at an address the user specifies. Can be used with Language Plus.

The Invoice Factory
Not just an invoice maker. It generates statements, aged receivable reports, product or customer reports, sales analyses. Use a new free form, automatic or standard invoice form.

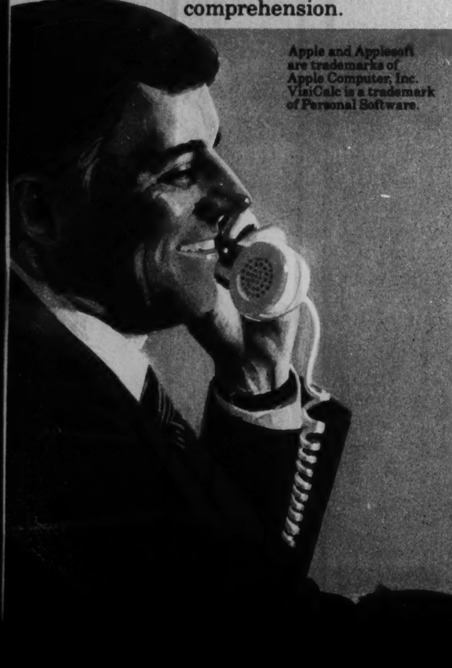
Tax Manager
For producing federal income taxes and printing the schedules. This easy-to-use program includes the latest tax laws and will remain current with our Extended Warranty option.

Payroll~Manager
A whole department that doesn't write itself a check. Figures hours and makes all standard deductions plus seven optional deductions and writes the checks. Unbelievably fast, and easy to use.

The Learning System
A company or educator may prepare a training/tutoring/testing device. Enter instruction or information; then key it to a tutorial drill or test to check for learning comprehension.

Data Manager III
A data base designed for the Apple III and can be used with floppies or hard disk drive. It will handle as many records as the storage media can handle with total flexibility.

Language Plus
A two volume library of machine language routines. These packages allow users, through Applesoft Basic, to speed up their performance in programming.



Apple and Applesoft are trademarks of Apple Computer, Inc. VisiCalc is a trademark of Personal Software.

Merger
A utility for the Data Factory and Invoice Factory. Merge data from fields in either program into those of another file.

V Blend
Allows users of VisiCalc™ to combine data in multiple VisiCalc™ files, merging the information into a new file.

Entertainment
Test your luck and skill with exciting games from Micro Fun.

Dogfight II
Crown of Arthain
Mad Venture
Painter Power
Roach Hotel
Peeping Tom
Palace in Thunderland
U.S. Constitution Tutor
English SAT I

micro lab
systems that work

2310 Skokie Valley Road
Highland Park, Il.
312-433-7550

Software that prompts you throughout the program.

NICE WORKING WITH YOU

CIRCLE 208 ON READER SERVICE CARD

series of experiments with vibrating ropes. These ropes are placed under different tensions, have different lengths, and have different masses per unit length (linear densities in the language of physics). Experiments for three values of each variable are recorded on the disc.

The student is asked to determine how each variable affects the frequency of vibration for the rope. Exactly what conclusions he is to reach and how he is to do so depend on the instructional level—red, green, or blue. For example, the red level student must use his data to derive an equation which describes how the frequency depends on the three variables, while the green level student must state how the frequency changes as each variable increases or decreases.

The videodisc is an excellent medium with which to present this experiment. In real time the motion of the ropes can be seen only as a blur. Using the slow motion capabilities of the disc, the motion is slowed to the point where the student can count individual vibrations. In addition, each frame on a disc is assigned a frame number. Since frames are shown in real time at a rate of 30 per second, the frame number provides a 1/30th second timer. Using slow motion and the frame number the student can collect data on vibrating ropes in a manner which is not practical in any other way.

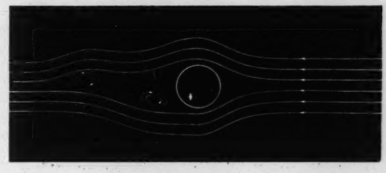
Once the student has completed analyzing his data, he must answer questions about his conclusions. First, he is queried about vibrating ropes. Then, to help him see how his conclusions apply to bridges, he is presented with questions such as the green level question in Figure 5. When he has completed this section, the student is ready to put all the pieces of the puzzle together.

The Conclusion

The two major parts of the puzzle—the wind and the properties of the bridge—have been investigated separately. To bring them together, the interaction between the two must be studied. This part of the disc does that at the three levels of instruction.

The red level student looks at the mathematical relations governing the oscillations of the bridge. In doing so he learns that the motions can be divided into two parts—vertical and twisting (torsional). For the Tacoma Narrows Bridge he learns that the frequency of twisting motion and vertical motion were almost identical. Thus, when a part broke and allowed the destructive twisting motion to begin, it did so quickly.

The blue or red level student sees a segment about turbulence which builds up on the downstream side of a flat object in the wind. With animated diagrams such as Figure 6 they learn how this turbulence can create pulsating forces on a bridge.



All three levels view other examples in which a pulsating force leads to periodic, and sometimes increasing, motion. A flag in the wind, a child on a swing and a bouncing ball are examples of similar physical phenomena.

As television inevitably does, instructional videodisc concludes with a TV commercial. Ella Fitzgerald (or was it Memorex?) displays one more example of a similar event—breaking a wine glass with sound.

Using The Disc

To date, a few hundred students have completed the lesson as described above. Most of them have learned the physics that we hoped they would. More important, they have become involved in the problem solving nature of the presentation. In this way they have learned a little about how science works and sharpened their own ability to look at new situations in a systematic way.

The Future

When we were developing the disc, we included material which would require computer control for full interaction. While the lesson does not require this material to solve the puzzle, it can be designed so that students have more control over what they see. Thus, a program to use the disc under computer control is under development. When that program is completed, we will have finished our work on this disc.

Our experiences with The Puzzle Of The Tacoma Narrows Bridge Collapse have encouraged us to continue developing videodiscs for physics instruction. One videodisc, Physics And Automobile Collisions, is complete but has not yet been used by students. Several others are in various stages of development. In each case we are constructing the discs so that students are presented with problems they must solve, and at least part of the solution involves taking data from videodisc. With this type of instruction we hope to increase students' abilities in physics and problem solving. At the same time we hope they have as much fun learning from videodiscs as we have producing them. □

The First Commercially Available Level Two Instructional Videodisc

What do you do with an interactive videodisc for physics instruction once it is completed. About a year ago we were faced with that problem. After showing it to our friends, relatives and professional colleagues, we looked for a commercial distributor.

At that time the only optical discs being distributed were motion pictures and a few others such as The First National Kidisc. The distributors of these discs were not interested in a disc with as limited an audience as high school and college physics teaching.

Fortunately, a major science textbook publisher, John Wiley & Sons, was interested in this new form of delivering physics instruction. In the spring of 1982 John Wiley began selling The Puzzle Of The Tacoma Narrows Bridge Collapse ($125). Thus, this disc becomes the first Level Two disc to be available from a commercial source.

COTTAGE SOFTWARE

PACKER: Machine language program that edits all or part of your Basic program to run faster, save memory, or ease editing. The 5 options include UNPACK—unpacks multiple statement lines into single statements maintaining logic inserts spaces and renumbers lines. SHORT—deletes unnecessary words, spaces, and REM statements. PACK—packs lines into maximum multiple statement lines, maintaining program logic. RENUM—renumbers lines, including all branches. MOVE—moves line or blocks of lines to any new location in program. On 2 cassettes for 16K, 32K, & 48K. For TRS-80™ Mod I or III Level II or Disk Basic. $29.95

SYSTEM TAPE DUPLICATOR: Copy your SYSTEM format tapes. Includes verify routines. The Model III version allows use of both 500 and 1500 baud cassette speeds.
For TRS-80™ Model I or III Level II. $15.95

CASSETTE LABEL MAKER: A mini word processor to print cassette labels on a line printer. Includes 50 peel-and-stick labels on tractor feed paper.
For TRS-80™ Model I or III Level II & Printer . $17.95

PRINT TO LPRINT TO PRINT: Edits your Basic program in seconds to change all Prints to LPrints (except Print@ or Print#) or LPrints to Prints. Save edited version.
For TRS-80™ Model I or III Level II. $12.95

FAST SORTING ROUTINES: For use with Radio Shack's Accounts Receivable, Inventory Control I, and Disk Mailing List Systems for Model I Level II. Sorts in SECONDS! You'll be amazed at the time they can save. Supplied on data diskette with complete instructions.
FAST SORT for Accounts Receivable I. . . . $19.95
FAST SORT for Inventory Control I. $19.95
FAST SORT for Disk Mailing List (specify data diskette cassette for 1 drive system). $14.95
ALL THREE ROUTINES. $44.95

Prices subject to change without notice. Call or write for complete catalog. Dealer inquiries invited. VISA and MasterCard accepted. Foreign orders in US currency only. Kansas residents add 3% sales tax. On-line catalog on Wichita FORUM-80: 316-682-2113 Or call our 24 hour phone 316-683-4811 or write:

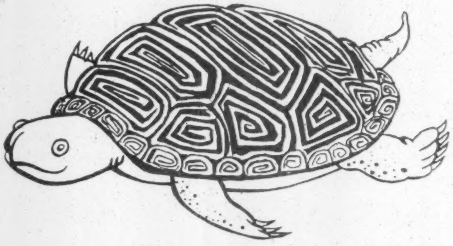
COTTAGE SOFTWARE
614 N. Harding Wichita, KS 67208

TRS-80 is a trademark of Tandy Corporation

CIRCLE 149 ON READER SERVICE CARD

TERRAPIN, THE TURTLE PEOPLE, NOW BRING YOU THE LOGO LANGUAGE FROM MIT.

In 1978 we introduced the Terrapin Turtle Robot. Once again, Terrapin takes the lead in educational computing, with our **Logo for the Apple II.**



HERE'S WHY YOU'LL "WIN" WITH TERRAPIN LOGO:

TERRAPIN LOGO'S UNIQUE FEATURES

- —IT'S EASY TO USE: write graphics programs from the start (by using simple commands like Forward, Left, and Penup)
- —USER-DEFINED PROCEDURES—create your own vocabulary of commands and use it to build complex programs
- —Floating point and integer arithmetic
- —Comes with FULLY-INTEGRATED SCREEN EDITOR, for programs and text
- —Powerful programming tools (like Procedures, Recursion and Lists) encourage structured thinking
- —Saves pictures to disk—print pictures INEXPENSIVELY
- —Assembly language interface capability
- —Available for NETWORKING SYSTEMS

EDUCATIONAL GUIDE PROGRAM

Developed by a staff of LOGO EXPERTS, including former members of the MIT Logo group.

- —Beginners learn step-by-step with Terrapin Logo's TUTORIAL MANUAL
- —SEMINARS for teachers and Apple-Users groups
- —HOTLINE—instant access 617-492-8816 for solutions to any of your questions
- —BOOKS on Logo and the Turtle Robot in education

Terrapin Logo is available at computer stores worldwide. For your nearest dealer call or write:

Terrapin, Inc.
380 Green St.
Cambridge, MA 02139
(617) 492-8816

TAKE THE LEAD IN EDUCATIONAL COMPUTING WITH TERRAPIN LOGO

CIRCLE 290 ON READER SERVICE CARD

LOGO Ideas

Robert Lawler

Passing The Buck

Sometimes difficult problems can be simplified by doing a small part and "passing the buck." This example is to clarify the idea and the Logo techniques for applying it. Suppose you want to print messages in a code where every word is spelled backwards, e.g. sdrawkcab. How can you write a procedure to switch letters around? You know the procedure begins with a title line and a variable input, such as:

```
TO SWITCHEM :INPUT
```

If the input to SWITCHEM has no letters, nothing should be printed — maybe a space. If the input is only one letter long (such as "I" or "a"), it should be printed. If the input is longer, you will always want to print the last letter of the input anyway, so you might as well do that and pass the buck (all those other letters except the last one) to another procedure, call it HARDER:

```
TO SWITCHEM :INPUT
IF EMPTY? :INPUT PRINT SPACE STOP
TYPE LAST :INPUT
HARDER BUTLAST :INPUT
END
```

Now, what should the HARDER procedure be like?

If the input to SWITCHEM was one letter long, the input to HARDER will have no letters — it should stop. If HARDER's input is one letter long, that letter should be printed. If longer, you will want to print the last letter of the input anyway, so you might as well do that and pass the buck (all those other letters of HARDER's input except the last one) to another procedure — call it EVEN-HARDER.

Doesn't that sound familiar? EVEN-HARDER will have to do the job that HARDER was supposed to do. HARDER does the same thing as SWITCHEM. The good trick in passing the buck is *you never have to write the HARDER procedure* if SWITCHEM calls itself:

```
TO SWITCHEM :INPUT
IF EMPTY? :INPUT PRINT SPACE STOP
TYPE LAST :INPUT
SWITCHEM BUTLAST :INPUT
END
```

What Good Is Planning?

One view is that planning breaks a problem up into parts, each of which can be more simply solved than can the whole. For example, if you wanted the turtle to draw a picture of a house, you probably would find it easier first to write a triangle procedure for the roof and a square for the storey then put the two together than you would composing a procedure for drawing the whole thing at once.

A richer view of planning is that the breaking up of a problem is very fruitful — because you will create partial solutions which can be used in different ways to make other things. Let's extend the HOUSE example. The simplest extension of a HOUSE would be to separate the parts from each other and reconnect them a different way. Doing so you could make a WISHINGWELL, such as the one drawn by this procedure:

```
TO WISHING.WELL
RIGHT 180 STOREY
RIGHT 180 FORWARD 100
ROOF
END
```

This attempt to use the parts of a HOUSE as parts of a WISHING-WELL runs into an immediate problem: the WISHING-WELL is bigger than the house. If you want both of them in the same picture, it will be necessary to make another triangle and square procedure for a small wishing-well. At this point, it makes sense to generalize the ROOF and STOREY sub-procedures, specifying their size by the use of input variables, as in the procedure below:

```
TO STOREY :SIDE
LEFT 90
FORWARD :SIDE/2
RIGHT 90 FORWARD :SIDE
RIGHT 90 FORWARD :SIDE
RIGHT 90 FORWARD :SIDE
RIGHT 90 FORWARD :SIDE/2
RIGHT 90
END

TO ROOF :SIDE
LEFT 90
FORWARD :SIDE/2
RIGHT 120 FORWARD :SIDE
RIGHT 120 FORWARD :SIDE
RIGHT 120 FORWARD :SIDE/2
RIGHT 90
END
```

Not only are these new procedures more flexible, the way they fit together can now be modified to make a better house than the original.

```
TO HOUSE.WITH.EAVES
RIGHT 180 STOREY 100
RIGHT 180 ROOF 120
END
```

Robert Lawler, Centre Mondial Informatique Et Resources Humaines, 22 Avenue Matignon, 7508 Paris, France.

What is Logo?

Molly Watt

Logo is a computer language which was developed to provide an environment which allows learning to take place as naturally as possible. Seymour Papert and his colleagues at Bolt Beranek and Newman and later at MIT set out to create a computer language which would combine the capabilities of artificial intelligence with the theories of Jean Piaget in order to allow a learner to build his own intellectual structures through estimation, interaction, experience and revision.

The Logo language is designed to provide an environment in which the child/learner is in charge of

- Setting a problem to solve.
- Making choices.
- Playing with the problem, experimenting and trying out solutions.
- Building on what he has already done to do something more.

The language is interactive. You learn it *at* the computer. After working with a problem for a while, you edit it, revise it, and then play your next steps.

With Logo, a young learner can enter directly into the world of turtle geometry. Without memorizing formulas, he can create procedures for drawing squares, triangles, and circles.

This is unlike my own experience in geometry. I learned geometry in high school only because I was required to take the course as preparation for college.

Geometric thinking is possible now for any learner without a series of prerequisites. At the Lamplighter School in Texas, three year olds have used Logo to explore turtle geometry. And MIT students use the concepts of turtle geometry used in Logo as a way to explore mathematics.

Seymour Papert is often quoted as saying that "Logo has no threshold, no ceiling." I have heard it said that Logo is a six year old's dream and a computer scientist's nightmare. Logo makes complex explorations possible for learners of all ages, without imposing artificial hurdles.

> ***With Logo, a young learner can enter directly into the world of turtle geometry.***

How does a child explore turtle geometry? It is really quite simple. Every child knows how to move from one place to another. Using his own experience in walking, a child "teaches" the turtle to move across a computer monitor leaving a trail or line to create a drawing.

Let's call our learner Wendy. Her first experience might be something like this:

1. She decides to experiment by drawing a square.
2. She paces a square on the floor to notice how she draws it.
3. She remembers how she did it and types a set of commands to the turtle which might look like this:

```
FORWARD 25 (no, not far enough)
FORWARD 25 (okay, that's enough)
RIGHT 40 (oh, that wasn't what I meant
at all, let's try more) RIGHT 40, (well
that's not it, try again) RIGHT 10 (that's it)
(let's see, what was it,) FORWARD 50
RIGHT 90
FORWARD 50
RIGHT 90
```

And so on until she has a square. With that accomplished, she can simplify the steps and teach the computer to do it by shifting to the edit mode. What shall the name of this procedure be?

Very often a student will name it with her own name, typing:

```
TO WENDY
FORWARD 50
RIGHT 90
FORWARD 50
RIGHT 90
FORWARD 50
RIGHT 90
FORWARD 50
END
```

The turtle will then "know" how to WENDY, and will execute a square every time the command WENDY is typed.

Now Wendy can enjoy playing with the procedure WENDY, and will probably type it over and over for the pleasure of watching the turtle "know" how to WENDY. The second WENDY will be drawn in a screen position which will surprise her, and our new Logo user will immediately type WENDY again just to see what happens. At the end of four

---

Molly Watt, Educational Alternatives, Gregg Lake Road, Antrim, NH 03440.

NEC's NEW ADVANCED PERSONAL COMPUTER GIVES CHARLIE THE BLUES.

If you're a businessman shopping for a personal computer, take a look at NEC. Our APC™ Advanced Personal Computer has better price/performance than any personal computer on the market.

It's a totally solutions-oriented system, supporting both CP/M-86™ and MS-DOS,™ developed to solve business problems in the simplest, most cost-effective way possible.

Our business software has been optimized to take advantage of the APC's unique hardware features. That makes system operation faster and easier.

Our software includes a full set of general accounting packages, word processing, mailing list management, business planning, database management, and communications. And we're readying many more.

We back our software with a unique unconditional guarantee. It will work or you get your money back.

Our APC comes with more information storage capacity than any system in its price range.

Our high-resolution color graphics run circles, arcs and lines around everybody else. The APC's screen images—lines, characters, pictures—are unprecedented in their clarity.

See for yourself how much better we are. The solutions-oriented Advanced Personal Computer from NEC. Return the coupon to NEC Information Systems, Inc., 5 Militia Drive, Lexington, MA 02173.

CP/M-86 is a trademark of Digital Research, Inc.
MS-DOS is a trademark of Microsoft, Inc.
APC is a trademark of Nippon Electric Co., Ltd.

NEC
NEC Information Systems, Inc.
5 Militia Drive, Lexington, MA 02173

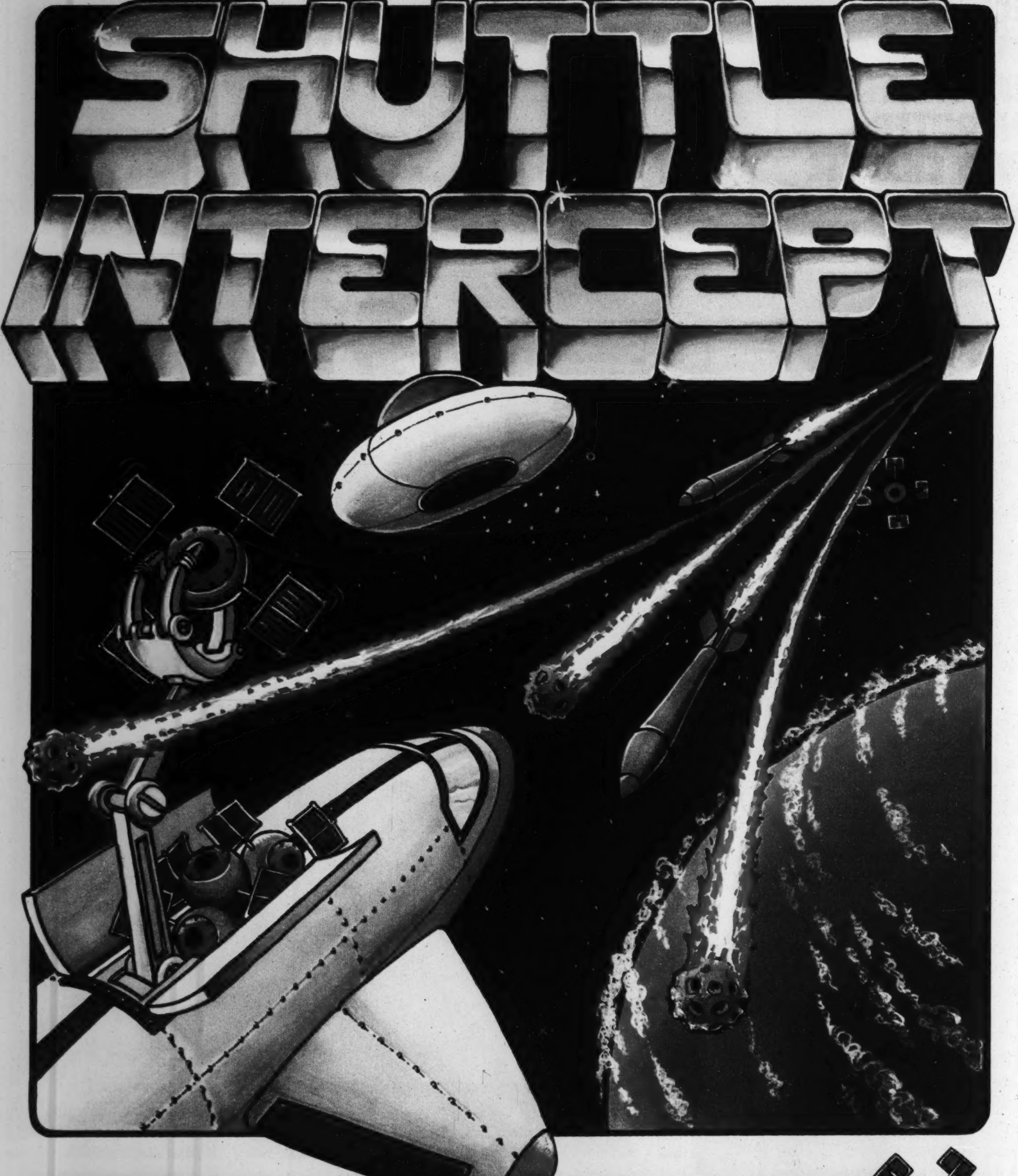
Send me more information
on the Advanced Personal Computer

Name ______________________
Title ______________________
Company ______________________
Address ______________________
City, State, Zip ______________________
Telephone ______________________

CC 1082

The Benchmark in World Class Computers

CIRCLE 225 ON READER SERVICE CARD



A New, Exciting Challenge from Hayden

Houston needs some satellites retrieved . . . a true test of skill, speed, and reflex!

It's non-stop excitement as you try to intercept friendly satellites with your shuttle hook, dodging asteroids, flying saucers, hostile satellites, comets, and guided missiles that are attacking faster and faster!

Warning: SHUTTLE INTERCEPT MAY BE ADDICTING! Surviving play testers rate this a #1 Challenge!

to order call:

1-800-631-0856

(in N.J. call 201-843-0550, ext. 382).

SHUTTLE INTERCEPT, #19009, Apple II disk, $34.95

HAYDEN **SOFTWARE**

CIRCLE 175 ON READER SERVICE CARD

WENDYS, there is a new design which can be taught to the computer as a procedure containing the subprocedure WENDY. It looks a bit like a window, so Wendy can type:

```
TO WINDOW
WENDY
WENDY
WENDY
WENDY
END
```

or

```
TO WINDOW
REPEAT 4 (WENDY)
END
```

Wendy has started the process of

- Learning to control the turtle.
- Using the computer as a tool.
- Teaching the computer to execute an original idea and naming it.
- Noting the steps she used in order to save them as a procedure.
- Using the procedure as a subprocedure in her second procedure.

She has started to create her own computer language.

Taking the same example one step further, our new Logo user, in playing with WINDOW, may quickly discover that by using the procedure WINDOW and then rotating the turtle's position slightly a new design is made that holds a shape which begins to approximate a circle. This experiment can be formalized by typing, for example,

```
TO ROSEWINDOW
REPEAT 9 (WINDOW RIGHT 10)
END
```

As in all learning, the first job is to learn to control your tool. If you are using a pencil, you must practice holding it.

Your first written word may be your own name, which is a profound word to the writer. It permits you to show ownership, authorship, borrow library books, sign a check and send a greeting card through the mail. It is still a long jump to writing a dissertation or even applying for a job. However that one word puts you into the powerful world of words which make up magazines, recipes and phone books.

Figure 1. Wendy.

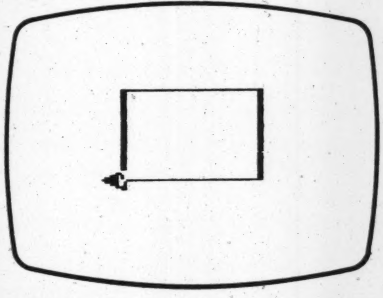


Figure 2. Window.

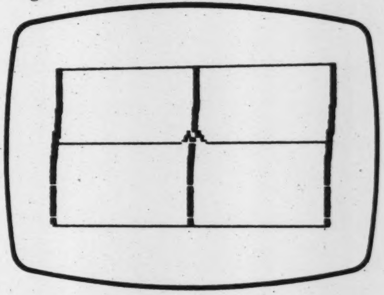
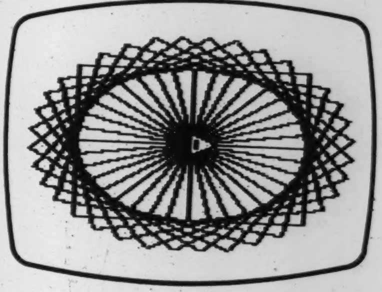


Figure 3. Rosewindow.



So it is with this first turtle drawing: Suddenly the Logo user is part of the world which assigns airplane reservations, cashes checks, and launches space shots. This is a world of power, which has in this first lesson become part of Wendy's own learning continuum. The process is intrinsically motivating and fascinating.

As every person can learn to use a pencil, everyone can — and will — learn to program a computer.

Projects by New Users

I think that it is important to look at some examples of tasks that some real students have set for themselves as problems to solve when beginning to learn Logo and to use a computer.

My purpose is to demonstrate the many working styles and interests which Logo can support. These students were in my classes in Amherst and Cambridge, MA and were between the ages of 8 and 17.

After several class sessions in a hands-on laboratory, I often suggest to my students, "See if you can make the turtle draw your initials." Many try the project, seem to enjoy the challenge, and then go on to some other experiment.

Two students, Ted and Stella, were working side by side, and became completely absorbed in drawing letters. Each determined to create a complete alphabet.

Ted immediately wrote a procedure to produce the whole alphabet, before creat-

Microcomputer Programs

Above the Crowd

MCE offers you superior microcomputer programs in Basic Living Skills. These programs have been field tested and found effective.

MCE programs are sophisticated yet simple to use. They offer curriculum flexibility in special ed., voc. ed., home economics, functional math and consumer ed. among others.

Eighteen programs are available from $44.95 for Apple II®. They feature: branching to individual reading and ability levels, a variety of instructional formats, vivid color graphics and advanced teacher control options.

To learn more about MCE programs call collect (616) 345-8681 or return the coupon below.

mce T.M.

MCE INC.
157 S. Kalamazoo Mall
Kalamazoo, MI 49007

MICROCOMPUTER EDUCATIONAL PROGRAMS

☐ Send MCE catalog ☐ Request demonstration

Name ____________

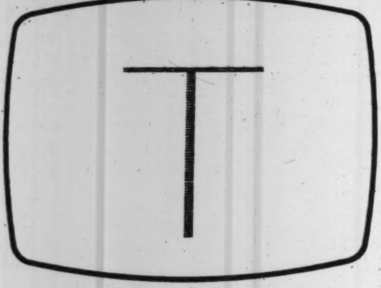
Address ____________ H10

City ________ State ________ Zip ________

Phone ____________ Best time ________

CIRCLE 199 ON READER SERVICE CARD

Figure 4. T.

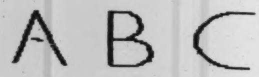


Listing 1. Time.

```
TO WAIT :T
 IF :T = 0 STOP
 WAIT :T - 1
END

TO TIME :HH :MM :SS
 TEST :SS = 60
 IFT MAKE "SS :SS - 60 TIME :HH ( :MM + 1 ) :SS
 IFF MAKE "SS :SS + 5
 TEST :MM = 60
 IFT MAKE "MM :MM - 60 TIME ( :HH + 1 ) :MM :SS
 TEST :HH = 12
 IFT MAKE "HH :HH - 11
 WAIT 200
 PRINT []
 ( PRINT :HH :MM :SS )
 TIME :HH :MM :SS
END

"FALSE is 1
"TRUE is 1
```

ing the individual letters. It looked like this:

```
TO ALPHABET
A
DRAW
B
DRAW
C
DRAW
.
.
.
END
```



Ted then began the long process of creating procedures to draw each letter in turn After his alphabet was completed he was dissatisfied with the amount of time each letter was displayed on the screen. He began to work on the more complex programming problem of creating something for the computer to do invisibly so that the letter on the screen could continue to be displayed for a longer period. This was a natural extension of his alphabet procedure.

Stella started out to solve what appeared to be the same challenge as Ted's. During the process, she became fascinated by the proportions of height and width and how a variable input could change the relationships represented graphically.

The qualities of the computer which allowed her to experiment with inputs and then provided her with an almost instant reformulation of her letters heightened her excitement as well as her understanding about one way a computer could extend her thinking.

She began to collect patterns for monograms and initials which might make interesting designs on stationery. Her classmates used her program to think about embroidering on denim. For her final project, Stella created an art show using Logo procedures.

In one of the first Logo classes, Mark and Suzy became a working team. Mark seemed to need to be admired for his programming prowess and Suzy was reluctant to touch the computer.

This combination worried me because it seemed to reproduce the stereotyped, and I believe harmful, pattern of the way men and women relate to technology.

This twosome often seemed to have private jokes and to direct gestures toward classmates. Although I felt uncomfortable and wondered whether I should intervene, their classmates paid them no attention.

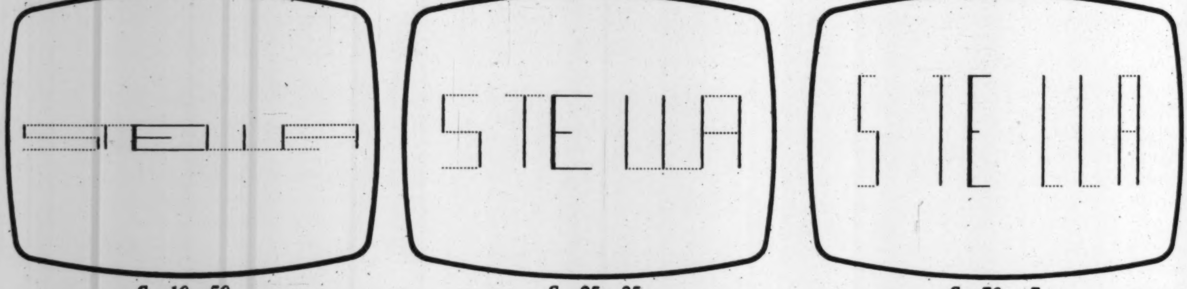
In the meantime, I watched and thought about them whenever I had a second to spare from this demanding programming class. I was aware that none of my suggestions had been accepted by either of them. While Mark was actively executing his ideas, Suzy admired, and I waited.

Then one day the duo split, each needing a computer to work on.

Mark was inventing a clock. It was a digital clock. The person using his program could type in the hour, minute and second and could then watch time move in five-second increments. His ability to capture some essence of time was satisfying to him, and truly mystifying to his classmates. Mark told them that his program was simply an approximation of time as is the time that all clocks keep.

Listing 1 shows how his program looked after a solid week of programming.

Figure 5.



S 10 50 *S 25 35* *S 70 7*

Learn it in a FLASH

michael shrayer's

ELECTRIC pencil™

word processing system

● **Easy to Learn** – Like lightning you will be up and running with a comprehensive and sophisticated word processor. Our manual says you can be an expert in one hour, our users tell us it takes less than 30 minutes. The manual's 128 pages are packed with figures, illustrations and examples for the beginner and "old pro".

● **Easy to Use** – With the ELECTRIC PENCIL you process words, not commands. ELECTRIC PENCIL's menus and simple two keystroke commands keeps your mind on your work, NOT on your manual. ELECTRIC PENCIL is so easy to use your secretary will WANT to use it... so sophisticated you'll be glad she did. David Ahl, the editor of Creative Computing says, "ELECTRIC PENCIL 2.0 is the most user friendly word processing package available."

● **Features** – ELECTRIC PENCIL has a 36k+ text buffer (48k disk system), supports disk, tape and Stringy Floppy files (disk version)* and has every major feature you want in a word processor. It is "bullet proof" – Data recovery is a built-in feature. The exclusive DICT-A-MATIC† feature gives your office the flexibility of dictation-word processing without fancy equipment. Your dictation playback is controlled from the computer keyboard.

● **Flexible** – It is the only word processing system that is designed like an operating system. You can add new programs and features to ELECTRIC PENCIL, such as RED and BLUE PENCIL dictionary/correction – with a 50,000 word dictionary (sold separately) – without patches and upgrades. Simply press one of the control key combinations and new additions to your system are instantly available. Add automatic proofing, spelling correction, dynamic print formatting, proportional printing, communications, graphics and typesetting and many other add-on features when you need them.

● **Versatile** – ELECTRIC PENCIL runs on TRS-80 model I and model III computers under all versions of TRSDOS, and NEWDOS without modification or patching (Patches required for other operating systems). It also supports parallel and serial printers as well as single and double density disk systems.

ELECTRIC PENCIL is the choice of thousands - make it yours for only $89.95 (disk version) or $79.95 (tape and Stringy Floppy versions). Manual only $24.95.

ELECTRIC PENCIL is available at computer stores, selected B. Dalton Booksellers and selected independent book dealers. If your dealer is out of stock, order direct (specify disk tape or Stringy Floppy version). Include $4.00 for shipping and handling. Foreign residents add $11.00 plus purchase price, in U.S. funds.

*Tape and Stringy Floppy versions support tape and stringy files only

IJG
1953 West
11th Street
Upland, CA
91786 (714)
946-5805

Stringy Floppy trademark EXATRON Corp
NEWDOS trademark APPARAT, Inc

TRS80, TRSDOS trademark TANDY Corp

† trademark IJG, Inc

CIRCLE 178 ON READER SERVICE CARD

NEW LOW-COST ENGINEERING/BUSINESS PLOTTER

AMDEK X-Y PLOTTER
PEN HOLDER
AMDEK
X-Y PLOTTER
AMDEK

Cost-effective "originals"

The Model DXY is an economical multi-pen, X-Y coordinate plotter that produces hard copy graphics in minutes for all types of business applications and technical disciplines. Priced at under $1000, it's compatible with the IBM, Apple and other personal computers. It has built-in software (expandable ROM) to interpret "Basic" commands. Just call, or write for complete specifications on the Model DXY Plotter. Ideal for end-user or OEM applications.

- 10″ x 14″ effective plotting range.
- Centronics interface for easy connection to your computer.
- Pens, penholders, chart hold-downs, and dust cover are included.
- Charts on popular graphics media including vellum and mylar.

2201 Lively Blvd. • Elk Grove Village, IL 60007
(312) 364-1180 TLX: 25-4786

AMDEK CORP.

Amdek . . . your guide to innovative computing!

CIRCLE 107 ON READER SERVICE CARD

His program does have some "bugs" which he has probably solved by now. One is the matter of conversion; the seconds do not convert to minutes after the number 60 is reached. This was not discouraging to Mark. This was the next part of his program which needed attention in order to make it work better.

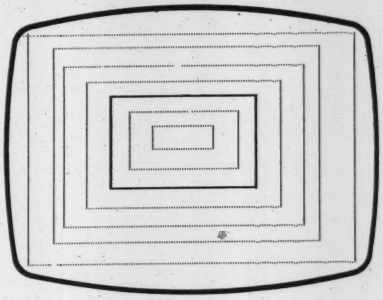
On the other side of the classroom, Suzy sat at a computer alone. At first she seemed to me to be immersed in a science fiction book. As I moved nearer, I saw that she was using the science fiction book as a reference for her work. She was working with an intensity I had not seen previously.

Between footstamps and fistshakes at the computer she was creating a science fiction book. She had discovered that the computer could print words. Linking her interest in reading science fiction with her limited knowledge of microcomputers, she had started on her first self-initiated project. She organized the procedures shown in Listing 2.

As the course ended, Suzy was beginning to experiment with turtle geometry to illustrate each chapter. My next steps for Suzy were to teach her how to save pictures drawn on the video screen, and to introduce her to the Logo text editor.

Suzy shared her project with her classmates during the last day of class. The science fiction aspect captured their imaginations, and they demonstrated genuine interest in her work.

Figure 6. Door Through Time.



With our visions of what is possible for a Logo user to accomplish, Suzy's example may not seem dramatic. I include it because I believe we often push students to go too fast and forget the value of allowing a person to set his own goals. I do not believe that Suzy would have started sooner if I had structured the lessons differently; she needed a period of watching to get herself ready.

One visually oriented student spent many class periods creating drawings, saving his pictures directly on his disk without writing procedures. Jamie planned color and line relationships carefully and gave names which suggested to me the dimension of fantasy the computer offered him.

While classmates often gave pictures and procedures single letter names to avoid laborious typing, Jamie was content to take the time to type "Door Through Time," "Sparkle in the Night," "Experience in the Fifth Dimension," delighting classmates with his naming as much as with the pictures.

Listing 2. Science Fiction.

```
TO MARS
 PRINT [A PRINCESS OF MARS]
 PRINT [THE GODS OF MARS]
 PRINT [THE WARLORD OF MARS]
 PRINT [THUVIA,MAID OF MARS]
 PRINT [THE CHESSMEN OF MARS]
 PRINT [THE MASTERMIND OF MARS]
 PRINT [A FIGHTING MAN OF MARS]
 PRINT [SWORDS OF MARS]
 PRINT [SYNTHETIC MEN OF MARS]
 PRINT [LLANA OF GATHOL]
 PRINT [JOHN CARTER OF MARS]
 PRINT [THIS IS THE MARS SERIES NO.1-11 IN ORDER
 BY EDGAR RICE BURROUGHS AUTHOR OF THE FAMEOUS
 TARZAN BOOKS]
 END

 TO DRAGONS
  PRINT [DRAGONFLIGHT]
  PRINT [DRAGONQUEST]
  PRINT [THE WHITE DRAGON]
  PRINT [THIS IS THE DRAGONRIDERS OF PERN TRILOGY
        BY ANN MCAFFERY]
 END
```

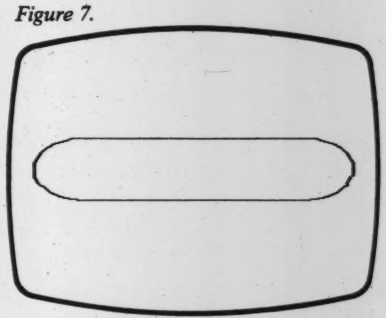
Another example of the way an individual entered the Logo environment or "mathland" is Jim. He simply started experimenting with the turtle.

He drew a shape which he later named "slot" because it looked like one. This slot with its circular ends and straight line connections intrigued him. During a series of lab periods, interrupted by several other projects, he progressed to "tslot" which added color and assumed a new position on the screen.

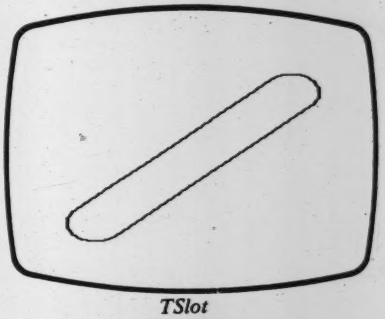
Next he played with variable inputs in order to experiment with size relationships. His moment of astonishment came when he discovered that the formula for a circle which he had memorized was approximate.

Jim was a serious student, and he often borrowed the Logo manual to read for homework. This provided him with many ideas about Logo primitives which might enable him to write more complex programs. He took himself beyond turtle

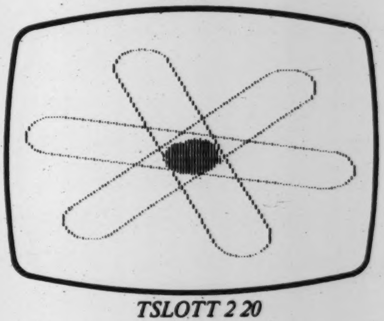
Figure 7.



Slot



TSlot



TSLOTT 2 20

geometry to write an interactive program which enabled the user to choose a polygon with any number of sides of user-specified length for the turtle to draw.

This project of Jim's pushed my programming ability, for I, too, was a new Logo user. I would often take my back-up copy of his disk home to work out various ways to solve his programming problems and bugs. After inventing or getting myself help with possible solutions or simpler examples, I created a new file called HELP to provide him with examples of possible solutions to his problem.

Jim, being an independent thinker, would study the examples in my HELP file, then say thoughtfully, "No, I don't believe that I want to do it that way," and continue with his own exploration and problem solving. I did notice that some of the HELP ideas found their way into his programming, and most of the inventions remained Jim's own.

At the end of the session, Jim was still working on centering his polygons above the text, and I had begun to use a HELP file with other students.

My first task was to invent a computer culture.

My last example is Manual. I have no file for his work. He was the class conceptualizer. He had started using computers because he enjoyed the fast action and energy of video games. He knew what would make an exciting program. Manual would strike up a conversation with a likely programmer describing an idea for a program. The talk continued as the other student moved toward a computer and started working out Manual's ideas. When Manual was satisfied that the person was "hooked" on the idea, he retreated and started another person on another idea.

I have Manual to thank for the work I do in the middle of the night, figuring out how to make a ball-shaped turtle appear to "bounce" off the edges of the screen.

These stories offer examples of the many ways in which students can explore a computer environment using the Logo Language.

Perhaps I've made it sound as if it "just happens." Because Logo permits a student to discover in a manner which is natural to the learning process it may appear that I have undervalued the teacher's role. Now we will look at some of the ways I have come to think about my role as teacher in a Logo classroom.

The Teacher's Role

Every computing class I have led has been made up of students with a wide variety of experience and knowledge about computers. Some students have never seen a real computer. Some may even be certain that the computer is *the* enemy of humanity and spend energy directing prejudicial comments toward it. Other students may own their own computers, belong to "user's clubs" and have been programming for years.

This situation in itself was somewhat unnerving to me. I had made a commitment to myself to become knowledgeable about Logo and instructional uses of computers in order to integrate this tool into a school curriculum. I was determined to create a relationship between the current computer revolution and life in school.

I had no models. I had never used a computer nor seen any person other than my husband use one. My first task was to invent a computer culture. This culture needed to be able to support all the students *and* me as a learner alongside them.

Any teacher's first job is to assess the situation and equip himself with:

- Knowledge
- Experience
- Hardware
- Time

We must examine our own attitudes about computers in our society, acknowledge the areas creating distress and identify the areas bringing optimism.

As Logo teachers our roles will cover a diverse, and perhaps uncomfortable range including demonstrator, teacher/lecturer, teller, time structurer, problem setter, management solver, arbitrator, decision maker, challenger, helper, collaborator, process sharer, question asker, idea extender, observer, documenter, admirer, enjoyer, time provider, technician, and model learner.

I require each student to keep a journal of process notes, questions and descriptions of problems encountered. I read these regularly and respond.

In response I might write a comment which is similar to an oral response, "That sounds frustrating,"; "Wow! You figured it out!"; "I'd like to see how your procedure works"; "Jim figured out how to do a similar problem, why not ask him for help next time?"; "I don't know the answer to this question, let's get together after school and visit the computer store."

The journals provide a valuable vehicle in which to keep track of progress and to allow patterns to become visible. Often simply describing a problem will allow a student to understand it more fully, and thus be able to solve it. Journals provide direct access to help. They enable students to formalize their own thinking.

The journals provide me with a sense of being in charge, of knowing what is going on, and, a means of keeping records of student work. They provide an opportunity for a personal relationship with each student on a daily basis. Since I am also learning Logo, the journals provide me with a sense of comfort; I can see what I need to learn, and decide what my own homework will be.

Beyond this, the journals provide both the students and me with an assurance that this is a collaborative learning experience, and that I am working *with* them. Confidence about this allieviates, I believe, for both the students and me the sense of anxiety which might otherwise be present in teaching and learning this subject. Most educators agree that anxiety interferes with learning.

As a Logo programming teacher, it is my job to make back-up copies of all my students' disks in order to protect the students from work loss due to damage or filing mistakes and to enable me to see the patterns in the work of individuals so I can plan my next formal lesson for the class.

Journals provide direct access to help. They enable students to formalize their own thinking.

I can collect small groups of students around a common interest or programming problem. Sometimes I will ask a student to share some work with the whole group as a teaching example or as a model. By examining the work on the back-up disks I can also determine whether a programming problem should be solved with a "gift" of a tool which the programmer is probably not yet ready to invent on his own. (Some tools I have given include procedures for creating circles, explosions, and countdowns.)

The disks give me time to work on programming problems by *trying* the program, and trying several solutions, away from the stress of a class period. Inevitably the disks force me to think about my own next learning steps.

During the actual lab time I wander, watch, listen, and answer.

I feel that the words I use are important.

Instead of solving a problem for a youngster by telling or showing the solution immediately, I usually say: "describe the problem," "Tell me what happens", "What did you want to have happen?"; or "Try it now and show me." Some teachers ask the student to "Teach me what you did."

This type of response is important for several reasons.

- It gives me, as teacher, time.
- It gives the student time.

Electronics Div. Card #1

RUSH THIS POSTAGE-PAID CARD FOR YOUR FREE CATALOG

NO SALESMAN WILL CALL

NEW!

- Computer electronics with new TRS-80 Model III state-of-the-art computer
- TV/Audio/Video servicing with choice of computerized Heath/Zenith color TV, videocassette recorder, or stereo system
- Industrial Electronics for Instrumentation and Control technicians with TRS-80 Color Computer for hands-on training
- Electronic Design Technology with design lab program for creative circuit and equipment design

WE'LL TRAIN YOU FOR THE GOOD JOBS
NRI HOME TRAINING IN
SMALL ENGINE REPAIR
NRI
Home Training in
Air Conditioning,
ELECTRONICS

Name (Please Print) Age

Street

City State Zip

CHECK ONE:

- ☐ Microcomputers and Microprocessors
- ☐ Color TV, Audio, and Video System Servicing
- ☐ Digital Electronics
- ☐ Electronics Design Technolgy
- ☐ Industrial Electronics
- ☐ Communications Electronics • FCC Licenses • Mobile • Aircraft • Marine
- ☐ Basic Electronics
- ☐ Small Engine Servicing
- ☐ Appliance Servicing
- ☐ Automotive Servicing
- ☐ Auto Air Conditioning
- ☐ Air Conditioning, Heating, Refrigeration, & Solar Technology
- ☐ Building Construction

All career courses approved under GI Bill. ☐ Check for facts.

BB

Accredited by the Accrediting Commission of the National Home Study Council

175-102

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 10008 WASHINGTON, D.C.

POSTAGE WILL BE PAID BY ADDRESSEE

NRI Schools
McGraw Hill Continuing
Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016

Everybody's making money selling microcomputers. Somebody's going to make money servicing them.

New NRI Home Study Course Shows You How to Make Money Servicing, Repairing, and Programming Personal and Small Business Computers

Seems like every time you turn around, somebody comes along with a new computer for home or business use. And what's made it all possible is the amazing microprocessor, the tiny little chip that's a computer in itself.

Using this new technology, the industry is offering compact, affordable computers that handle things like payrolls, billing, inventory, and other jobs for businesses of every size...perform household functions including budgeting, environmental systems control, indexing recipes. And thousands of hobbyists are already owners, experimenting and developing their own programs.

Growing Demand for Computer Technicians

This is only one of the growth factors influencing the increasing opportunities for qualified computer technicians. The U.S. Department of Labor projects over a 100% increase in job openings for the decade through 1985. Most of them *new* jobs created by the expanding world of the computer.

Learn at Home in Your Spare Time

NRI can train you for this exciting, rewarding field. Train you at home to service not only microcomputers, but word processors and data terminals, too. Train you at your convenience, with clearly written "bite-size" lessons that you do evenings or weekends, without going to classes or quitting your present job.

Your training is built around the latest model of the world's most popular computer. It's the amazing TRS-80™ Model III, with capabilities and features to perform a host of personal and business functions. No other small computer has so much software available for it, no other is used and relied on by so many people. And it's yours to keep for personal or business use.

(TRS-80 is a trademark of the Radio Shack division of Tandy Corp.)

You get plenty of practical experience. Using the NRI Discovery Lab® that also comes as part of your course, you build and study circuits ranging from the simplest to the most advanced. You analyze and troubleshoot using the professional 4-function LCD digital multimeter you keep to use later in your work. Then you use the lab and meter to actually access the interior of your computer...build special circuits and write programs to control them. You "see" your computer at work and demonstrate its power.

Computer Assisted Instruction

Your TRS-80 even helps train you. You receive 4 special lesson tapes in BASIC computer language. Using them in your microcomputer, you "talk" to it as you progress. Errors are explained, graphics and animation drive home key points. Within a matter of minutes, you'll be able to write simple programs yourself.

Become the Complete Computer Person

In addition to training in BASIC and advanced machine language, you gain hands-on experience in the operation and application of computers to business and personal jobs. You're trained to become the fully rounded, new breed of technician who can interface with the operational, programming and service facets of today's computers. You're ready to take your place in the new electronic age.

Other Opportunities

NRI has been giving ambitious people new electronic skills since 1914. Today's offerings also include TV/Audio/Video Systems servicing with training on our exclusive Heath/Zenith computer-programmable 25" diagonal color TV...Industrial Electronics, Design Technology...and other state-of-the-art courses.

Free Catalog...Mail Card No Salesman Will Call

Send the postage-paid card for our 100-page catalog showing all courses with equipment and complete lesson plans. There's no obligation other than to yourself. See how NRI can help you grow with the most exciting and important new field of the 80's. If card has been removed, please write to us.

NRI McGraw-Hill

NRI Schools
McGraw-Hill Continuing
Education Center
3939 Wisconsin Ave.
Washington, DC 20016

We'll give you tomorrow.

What is Logo, continued...

- Description is a matter-of-fact task which can diminish emotion and allow the describer to see what actually happened clearly. (Frequently in the middle of describing, a student will say "Oh, never mind, I see what I did.")

If *after* a student has described the problem and neither of us knows how to solve it, we write a plan together in plain English words. It includes a statement describing what the student *wanted* to have happen. Usually when a solution is not clear to either of us, we are working with an example which is too difficult for us. We substitute a simpler problem "for practice."

Then, together we write a superprocedure in the same way that Ted wrote one for his alphabet, before he had invented the subprocedures. I make very sure that the first step in the procedure is one that the student and I can solve successfully right then.

Other jobs for the teacher include collecting, displaying and identifying resources.

I have rarely seen a computer which is not surrounded by a group interacting with it and kibbitzing with each other in a most congenial way.

I use bulletin boards to stimulate the learning process. I might post a weekly "Mystery Procedure," a new command with its definition and examples of its use, a challenging programming idea, a procedure to copy, a picture of a student's procedure, or a chart of students' names indicating their specific areas of expertise in order to make peer tutoring possible for every student. Sometimes I post an interactive program for students to copy, use, then modify and make their own.

Creating a Supportive Community

The computer community which we establish in our classrooms is for many students (and teachers) a first computer culture. As educators, we must be concerned about the values which are formed and used by this community of learners.

Many question my use of the word "community" in connection with computers. However, I have rarely seen a computer which is not surrounded by a group interacting with it and kibbitzing with each other in a most congenial way.

Most computers are a social *and* an intellectual center in a classroom unless usage is specifically regulated otherwise. Watchers see new ways to solve problems, participate in brainstorming new ideas and derive a great deal of pleasure from the process.

Teena Crowley, a third grade teacher, said, "I wish Logo were everyone's introduction to community work. Everyone is involved and offers input from the start."

Usually during a first class with a group I find it important to declare myself a Logo *learner* as well as a Logo teacher. I do it because it is honest and because it establishes a basis for collaboration. The responsibility for helping and teaching and creating this class belongs to all. It is an ideal opportunity for me to model the motto "Life Long Learning," certainly an important part of any curriculum.

Many issues emerge in the establishment of a Logo community. One of the first is the issue of ownership of procedures. Is it copying or stealing to save work which did not necessarily originate from the saver's own inspiration?

The nature of Logo filing and saving makes it almost impossible for beginning users to keep separate files, and so from the first time SAVE is typed, a file of mixed-up origin exists.

I prefer to be excited by the possibilities of this "sharing" rather than regret it as a necessary "evil." I legitimize the sharing, giving, changing, and using of one another's procedures as part of the context of the community we are creating together.

I share my work with my students and I encourage them to exchange procedures among themselves.

Classes soon begin to create a vocabulary specific to their community. In one class a procedure named WING — basically an outwardly spirally triangle which appeared to fly across the screen — became a favorite expression for a way of moving quickly across a space with arms rotating rhythmically. This reference point created a sense of cohesion and inclusion among classmates and added a dimension of good-natured humor.

I credit some of my success in creating a supportive community to my insistence that part of the experience in computer class is participating in discussions about ethical and responsible computer use.

I am genuinely worried about how our society makes decisions about computer use. I make clear to my students that computers are surrounded by a human culture with developed values and a sense of conscious choice about their use.

I believe that one way people develop into responsible, rational human beings is by participating in discussions about dilemmas with peers.

I often start a discussion with a simple story. Ideally, it describes an issue which is real or potential issue for this class, without embarrassing any group member. Once I told about a filing mistake I made when making a back-up copy of Ted's alphabet. Half the procedures for creating letters disappeared through my mistake. I had to tell him what I had done to his work, and how sorry I was to have made such a silly and harmful mistake.

Part of the experience in computer class is participating in discussions about ethical and responsible computer use.

A 20-minute period of sharing of mistake stories followed. No one was required to talk, but all class members were expected to participate by being part of our circle. The rules also prevented comments or judgments being directed towards any person or point of view. Discussion was encouraged.

Other issues which have worked for discussions in my classes are:

- Scheduling of computer use.
- What about someone who doesn't take a turn?
- Is it okay to borrow disks, copy disks, change disks?
- What about using "bad" or "dirty" words to name procedures?
- Should all schools have computers?
- Should all kids have to learn to program a computer?
- Why would a girl want to use a computer?
- What kinds of information should a school computer keep?
- Is it possible to have a really "private" computer file?
- What are some ways computers work in our lives?
- How can I get my family to value my programming instead of dismissing me as a "brain"?

The discussion which touched me the most deeply was requested by my students at the end of a summer school session. The subject was: now that we know so much about computer programming, how can we help our teachers feel comfortable knowing less than we do, so we can have computers in schools?

Beyond these ways of thinking about structuring a class and a curriculum, there are many opportunities for collaborative programming. One teacher has helped her students create a class adventure game using Logo.

The class planned the rooms, and then pairs or individuals created the procedures

CRUSH THE KRYON EMPIRE
ENLIST IN
MEGAWARS

THE ULTIMATE COMPUTER CONFLICT

MegaWars, a real-time space battle between the forces of the Colonists and the Kryon Empire. Join an intergalactic shootout with up to eight starship commanders transmitting orders from the keyboard cockpits of their craft anywhere in the U.S.A.

Attacking, evading, scanning, communicating. That's MegaWars. Easy to learn but difficult to master. That's why CompuServe will give one free hour to every MegaWars player entering a game before December 31, 1982.

Call toll free 800-848-8990. You'll receive the illustrated guide to CompuServe, America's most comprehensive Videotex service, plus the MegaWars Commanders Briefing.

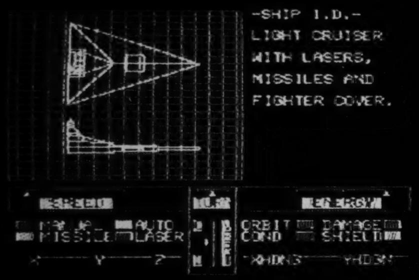
CompuServe

5000 Arlington Centre Blvd.
Columbus, Ohio 43220
800-848-8990

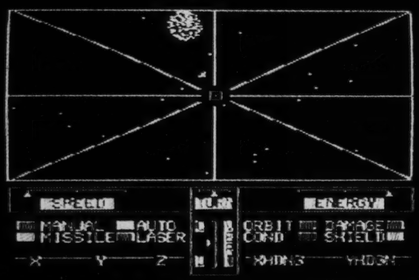
CIRCLE 135 ON READER SERVICE CARD

Adventure on a grand scale . . .

Space Vikings


-SHIP I.D.-
LIGHT CRUISER
WITH LASERS,
MISSILES AND
FIGHTER COVER.
SPEED
ENERGY
MANUAL
AUTO
MISSILE
LASER
ORBIT
COND
DAMAGE
SHIELD
X
Y
Z
XHDNG
YHDGN

A science fiction adventure in deep space. The galaxy is in rebellion. You command a Federation starship and your Viking troops are ready for battle.


SPEED
ENERGY
MANUAL
AUTO
MISSILE
LASER
ORBIT
COND
DAMAGE
SHIELD
X
Y
Z
XHDNG
YHDGN

Depart on the most exciting experience you've ever had with your Apple II.

SPEED
ENERGY
MANUAL
AUTO
MISSILE
LASER
ORBIT
COND
DAMAGE
SHIELD
X
Y
Z
768
200
-5811
XHDNG
YHDGN
0
0

48K, Apple II, disk, $49.95

See your dealer . . . see what you've been missing!

For direct orders, add $1.50 and specify UPS or first class mail. Illinois residents add 5% sales tax. Visa and MasterCard accepted.

subLOGIC
Communications Corp.
713 Edgebrook Drive
Champaign, IL 61820
(217) 359-8482
Telex: 206995

CIRCLE 285 ON READER SERVICE CARD

to make each room. Her role was to set up the structure and aid in the process of linking.

Harold Abelson's manual for Logo gives many examples of interactive programs which can be enjoyed by a class. Many teachers are using it to create their own programs for guessing numbers and creating crazy sentences.

Dan Watt's work creating curriculum for a dynamic turtle which moves according to laws of physics is interesting to use and then modify.

A great need exists for all Logo teachers to share their emerging curricula. This will enhance our collective understanding and provide more models about the ways students can work within a Logo environment.

What Logo Teachers Say They Teach

- Computer literacy.
- The history and learning theory in Logo.
- How to program a computer-like character, a turtle robot or Bit Trak.
- Controlling a turtle on a screen.
- How to pace out shapes and then teach the turtle to draw shapes.
- How to change pencolors and background colors.
- How to edit.
- How to initialize a disk.
- How to draw initials.
- How to use repeat.
- How to use subprocedures in procedures.
- How to use recursion.
- How to read a print-out of programs.
- How to draw procedure trees.
- How to use variables.
- How to use the Logo Manual.
- How to manage files and clear the workplace.
- How to use existing interactive programs and modify them.

This simple and straightforward list may be more or less what you expected. However when I ask my Logo students, whether school children or professional educators, what they learned in Logo class the list is quite different — fuller and more profound.

What Logo Students Say They Learn

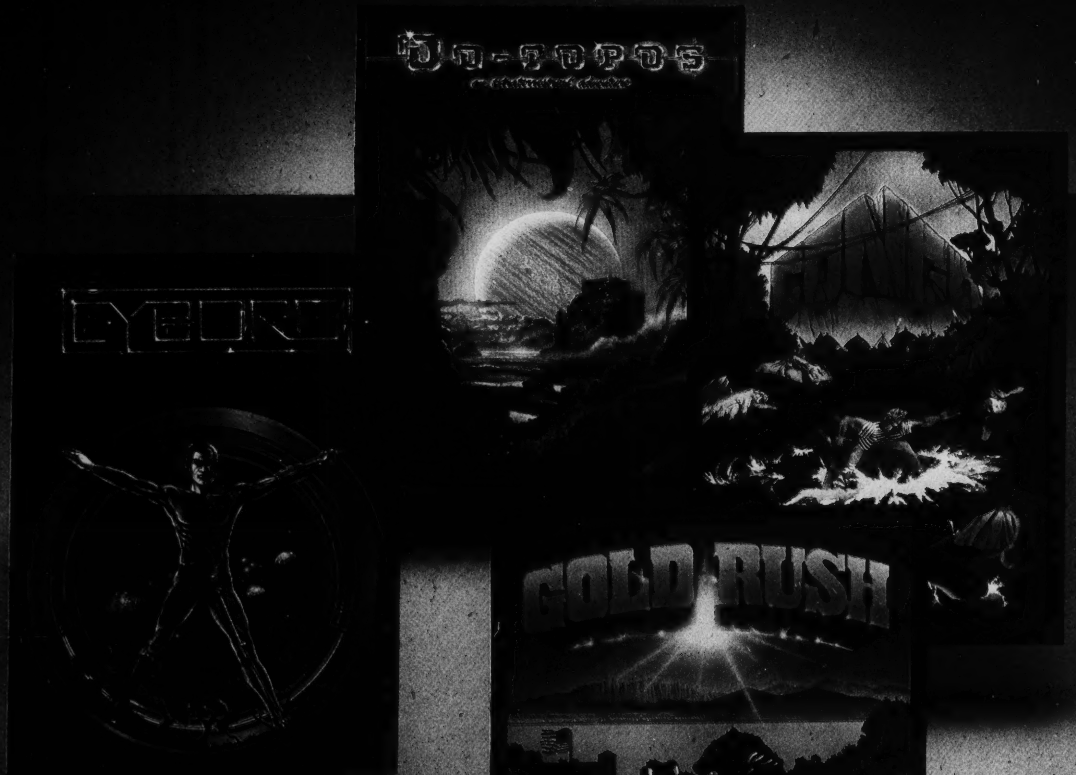
- About problem solving and estimation.
- About thinking and learning styles.

YOUR SCOOP
60¢
SOFT STUFF
ICE CREAM
CONES
CONES

This person used to develop applications for the 8086/8088 market with the best of them.

SOFTECH
MICROSYSTEMS

SENTiENT SOFTWARE



At Sentient we go to extremes to provide you with novel, natural, pure, inspired entertainment. These original games people play are available now.

Ask for them at your local computer store. Or order direct from Sentient Software.

Sentient . . . The Original Source.

Sentient Software, Inc., P.O. Box 4929, Aspen, Colorado 81612, 303/925-9293

©COPYRIGHT 1982, OO-TOPOS, CONGO, CYBORG AND GOLDRUSH.

CIRCLE 261 ON READER SERVICE CARD

What is Logo, continued...

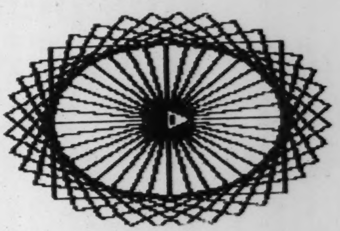
- About how to use their own learning style.
- To think logically.
- To work without emotional manipulations; the computer doesn't care whether you feel angry.
- To use procedural thinking.
- To use strategies for problem solving.
- To become comfortable thinking mathematically.
- To be able to think geometrically.
- To be able to consider laws of motion.
- About language by creating my own system for naming procedures.
- About graphics and design.
- How important revision of procedures and text is, and how simple it is to do.
- That decimals are useful.
- How to type.
- How to be patient.
- How to take risks in working.

The most significant things they claim to have learned include:

- Looking at their own mistakes with an interest in understanding what happened instead of shame.
- Feeling competent in setting their own problems and supported in solving them.
- Understanding that learning and doing involve frustration and ease; they go quickly or slowly, parts are intriguing or boring, and this is what makes up all work and life.

There is no question in my mind that working with computers is one way of forming a direct link with a sense of the future. Computers can provide a sense of optimism, new frontiers to be explored, and a kingdom to be conquered.

Logo was developed to create an interactive environment, a mathland, in which students could set their own pace, problems and goals. It is a comfortable way for me to enter the future. It is a challenging way and it is a way that I can understand, choose and control. ☐

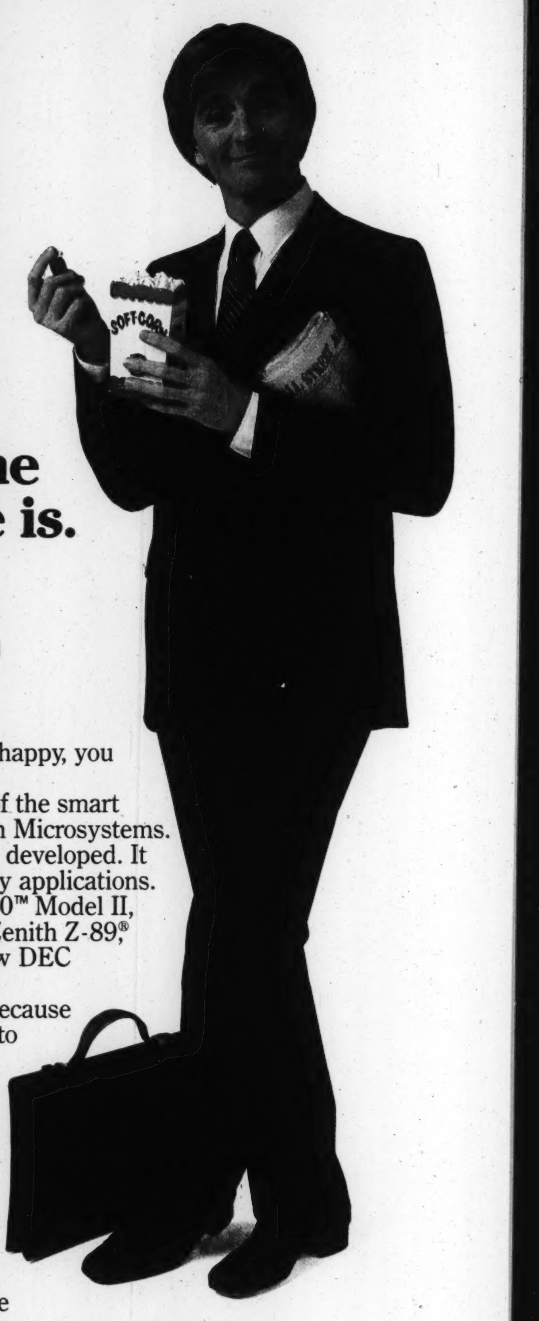


This person used to develop applications for the Z-80 market with the best of them.

BUTTERED POPCORN
SOFT-CORN
POPCORN
SOFT-CORN

SOFTECH
MICROSYSTEMS

This person develops applications for the entire market, including the Z-80, 8080, 8086/8088, 6502, LSI-11/PDP-11, 9900, and the M68000 with the best there is.



The Universal Operating System.™

Why does this application developer look so happy, you may ask?

Because, unlike others in his field, he's one of the smart ones. He uses the UCSD p-System™ from SofTech Microsystems. It's the first truly universal operating system ever developed. It lets him develop an awesome array of high-quality applications. And it's equally at home with an IBM PC, TRS-80™ Model II, Apple II,® Osborne 1,™ TI Business System 200,™ Zenith Z-89,® Hewlett-Packard HP-87,™ Philips P-2000,™ the new DEC Professionals,™ or any other micro in the market.

That makes our developer one of the elite. Because he'll never have to worry about locking himself into an operating system that will eventually lock him out of the market.

A Universal Operating System. At last.

Whether it's a Z-80, 8086/8088, M68000, 6502, or you name it, the p-System is portable across any popular microprocessor made anywhere today.

And we don't mean just at the source code level, either. We mean you can develop your program, on any machine, then compile to object code (p-code), and it's totally transportable.

You get it done right the first time. Every time. For any machine.

Now you can design for the whole market. Once and for all.

The p-System actually enables you to broaden your customer base without significant reinvestment in programming, time and time again. Simply because it's the only OS that runs the same object code programs on all popular 8- and 16-bit microprocessors. No matter who makes them. No matter who uses them.

And that's only the beginning. There's more to the p-System philosophy. Much more.

Take programmer productivity, for example. We know how much work you put into programming, so we understand the importance of streamlining that process. So we saw to it that the p-System allows you to reuse program components, time and time again.

It's been our experience that as much as 50% of the code developed for one application can be reused on others. And you can also create your own library of utilities suited to solving your own unique problems.

Try finding that on some other operating system.

All the tools you need for the job. Any job.

When you write your programs with the p-System, you can use any combination of UCSD Pascal,™ FORTRAN-77 and BASIC. Each language operating effectively with the others. So you can finally take advantage of the best features of each language—in a single program. And you also get a complete, fully integrated set of software development tools to make your job even simpler. Naturally. Including a screen editor, macro assemblers, and a debugger, as well as add-ons such as TURTLEGRAPHICS, Native Code Generators, and even Print Spoolers.

Our admirers have impeccable credentials.

In case you wondered who else believes in our Universal Operating System, there's the fact that the p-System is licensed by most of the major hardware manufacturers around. Manufacturers like IBM, DEC, TI, HP, Commodore, Osborne, Philips, and Zenith. You know, all those "little guys."

And the p-System's reliability is well-documented. Has been since 1977. And this, coupled with the upward compatibility of source code programs, has given the p-System five years of proven, documented field testing. By the toughest critics in the business.

Given all this, it's easy to see how your productivity can be enhanced.

Now you can develop higher quality applications faster, less expensively, and more dependably than ever before. For a much larger market.

All at the same time.

All on one machine.

All without worrying about some hardware enhancement limiting your business opportunities and leaving you with no other choice than peddling popcorn or ice cream on some lonely street corner.

If you don't believe it just take a look at our Applications Catalog to prove it.

At last, using the p-System, you can design programs once.

Once and for all.

SOFTECH
MICROSYSTEMS

I hear you, SofTech Microsystems. Please send me a brochure on the p-System, the world's only Universal Operating System. And keep me off the streets.

Please send coupon to:
SofTech Microsystems, 9494 Black Mountain Rd.
San Diego, CA 92126, or call (714) 578-6105

NAME_______________________________TITLE__________

COMPANY____

ADDRESS____

CITY____________________STATE__________ZIP________

TELEPHONE__________________________________EXT.____

UCSD p-System and UCSD Pascal are trademarks of the Regents of the University of California; Universal Operating System is a trademark of SofTech Microsystems; TRS-80 is a trademark of Tandy Corp.; Apple II is a registered trademark of Apple Computer Inc.; Osborne 1 is a trademark of Osborne Computer Corp.; Business System 200 is a trademark of Texas Instruments; Z-89 is a trademark of Zenith Corp.; HP-87 is a trademark of Hewlett Packard Inc.; P-2000 is a trademark of Philips Electronics; and Professional is a trademark of Digital Equipment Corp.

CC

CIRCLE 266 ON READER SERVICE CARD

VIDEODISC UPDATE

Anyone trying to track down the Aurora interface (Apple II to Pioneer VP-1000 videodisc player) mentioned in our January 1982 issue may have had a problem. Reason: Aurora is still around but they sold the rights to the interface to another firm, Anthro-Digital Software, P.O. Box 1385, Pittsfield, MA 01202. It's now called the Omniscan Laser Video Disc Interface and is available with software for $250.

Anthro-Digital also offers a Flipper for $50 which switches Apple output signals (two in to one out or one in to either of two outs), an excellent word processing system (The Executive Secretary), a mini word processor for the Hebrew language ($60) and several other interestsing products.

AMDEK PRICING

Two new Amdek products were mentioned on this page in the August issue. The final prices announced at NCC were different than our advance information. The 3" microfloppy disk drive is $899 (not $699) and the digital plotter is bargain priced at $949 (not $1200-1300).

JAPAN, INC. GETS SMARTER ABOUT SOFTWARE

For three years we have been admiring the computers and peripherals from various Japanese makers. But none has really proved a threat to American makers. Why not? In one word, software, or lack thereof. As I observed back in the October 1975 *Creative Computing*, a computer without good software might as well be a boat anchor.

Not many Japanese computers have wound up as boat anchors, but not many have been sold in the U.S. either. However, that is about to change dramatically with the strokes of several pens on contracts between Microsoft and three Japanese manufacturers.

MS-DOS, a 16-bit operating system developed by Microsoft for the IBM PC, will be implemented on computers from Hitachi, NEC, and Panasonic. Also, Wang, a major force in the WP market, has tapped Microsoft to implement MS-DOS on their low-end "professional computers."

Along a similar vein, the Structured Systems Group has also signed on the dotted line to convert their accounting software to several Japanese makes.

As if this weren't enough, take a look at the phenomenal amount of software released by NEC for the PC8000 series (see CES/NCC report in this issue). Not only that, but NEC has announced a similar committment for the just-announced Advanced Personal Computer.

We also can't help but be mightily impressed with the new 16-bit Mitsubishi computer. It supports CP/M-86 and has dual 300K disk drives and 128K RAM standard. As if that weren't enough, it also includes IBM 3270 emulation, Tektronix 4010 emulation, MBasic Plus, Fortran, Cobol and two versions of Pascal.

Someone must have told the Japanese about software. They listened and learned fast!

ATARI/LUCASFILMS JOINT VENTURE

In an uncharacteristicly low-key press conference at CES, Atari announced the formation of a new company owned 50-50 by Atari and Lucasfilms (creators of *Star Wars*, *Empire Strikes Back* and *Raiders of the Lost Ark*). The union was apparently sparked by Smalltalk-creator Alan Kay formerly of Xerox PARC (Palo Alto Research Center), now of Atari. What did Alan Kay have to say? Well, seems he ducked out of the press reception early--if he was ever there at all.

Anyway, after ducking all questions, an unnamed spokesman for Atari told us that the first product of the joint venture will be a video game based on *Raiders of the Lost Ark*. What else? No answer.

Are we optimistic? Guardedly, yes. But as Charlie Brown once said, "there is no greater burden than having a great potential."

TRS-80 COLOR COMPUTER TO BE SOLD IN INDEPENDENT OUTLETS

Tandy with some 6000 Radio shack outlets for TRS-80 computers is looking for even greater retail penetration. A first move toward this goal is the signing on of 60 RCA consumer electronics distributors to handle a repackaged version of the TRS-80 Color Computer. These 60 distributors service about 2000 retail outlets.

The color computer will be repackaged in a white case and will carry the designation TDP System 100, with TDP standing for Tandy Distributor Products. Pricing will be comparable to the existing unit in Radio Shack stores ($399 for 16K version, $499 with extended Basic).

MATTEL: HERE WE GO AGAIN

The on-again, off-again release of the keyboard unit for the Mattel Intellivision video game accompanied by lower and lower prices is on again. The original price of $700 in October 1979 was far over competitive units. However, pricing was the least of Mattel's problems since the keyboard unit was plagued with hardware problems and lacked applications software.

A re-release of a re-engineered unit at a lower price is now scheduled for 1983. 1983!? Well, we'll see.

K-MART COMMITTING TO COMPUTERS

K-Mart announced that 1100 stores will handle the Commodore VIC-20, up from 550 stores two months ago. In addition, a spokesman confirmed that the chain has committed to an equal dollar amount (around $10 million) of TI 99/4A home computers. The chain also expects to handle the lower-priced ($100) Timex/Sinclair unit.

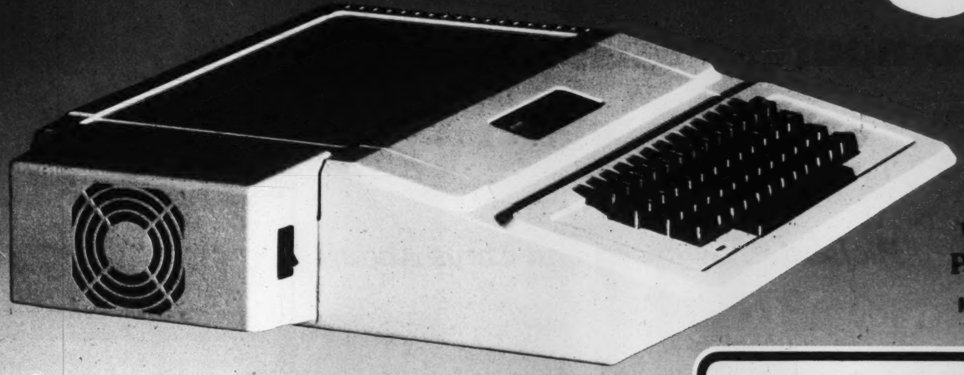
RH ELECTRONICS, INC.

COPYRIGHT © [illegible] — PATENTS PENDING

566 Irelan, Buellton, CA 93427
(805) 688-2047
8:00 TO 5:00 CALIFORNIA TIME

COMPUTER PRODUCTS
DESIGNING • MANUFACTURING
ELECTRONIC ENGINEERING

SUPER FAN II™
FOR YOUR APPLE II* COMPUTER



One Year Warranty

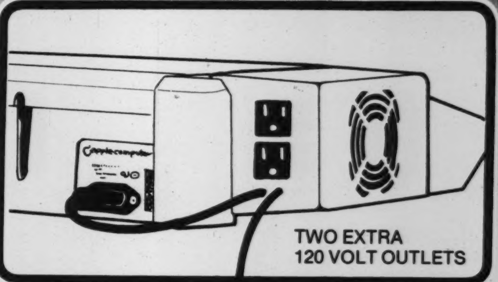
$74.95

With Zener Ray™ Protection $109.00

MASTERCARD — VISA

"COOL IT"

- ALSO FITS ON APPLE'S* NEW MONITOR STAND
- RED PILOT LIGHT ON/OFF SYSTEM SWITCH
- CLIPS ON — NO HOLES OR SCREWS • REPLACEABLE SWITCH
- AVAILABLE IN 120V or 240V AND 50/60 HZ • DURABLE MOTOR
- REDUCES HEAT CAUSED BY EXTRA PLUG-IN CARDS
- SOLD WORLD WIDE • UNIQUE 1 YEAR WARRANTY
- TAN OR BLACK COLOR • QUIETEST FAN ON THE MARKET
- INCREASED RELIABILITY — SAVES DOWN TIME AND REPAIR CHARGES
- LOW NOISE DUE TO DRAWING EFFECT OF AIR THROUGH YOUR COMPUTER AND SPECIAL FAN AND MOTOR DESIGN
- TWO EXTRA 120V OUTLETS FOR MONITOR AND ACCESSORIES TURN ON WHEN YOU TURN ON YOUR FAN (NOT AVAILABLE ON 240V MODEL)


TWO EXTRA 120 VOLT OUTLETS

SUPER FAN II™ WITH ZENER RAY OPTION $109.00

ZENER RAY™ TRANSIENT VOLTAGE SUPPRESSOR

OUR BUILT IN ADVANCED DESIGN UNIT GIVES
DRAMATIC COST SAVINGS — STOPS ANNOYING DOWN TIME
INSURANCE FROM VOLTAGE SPIKES - GLITCHES
DANGEROUS VOLTAGE SPIKES CAN JEOPARDIZE YOUR COMPUTER SYSTEMS
PROTECT COMPUTER - DISK DRIVE - PRINTER AND MONITOR

NO CUTTING WIRES • WON'T VOID WARRANTY, JUST PLUG IN SUPERFAN II WITH ZENER RAY

OTHER PRODUCTS BY **RH ELECTRONICS, INC.**

SUPER RAM II™ 16K RAM CARD FOR YOUR APPLE II. 2 YEAR WARRANTY $125
GUARDIAN ANGEL™ AN UNINTERRUPTABLE POWER SOURCE $595
12 VOLT TRANSVERTER 12 VOLT — RUNS YOUR APPLE II COMPUTER AND AND 5¼" DRIVE FROM YOUR CIGARETTE LIGHTER $149

*Registered trademarks of Apple Computer Inc.

DEALER INQUIRIES INVITED

CIRCLE 397 ON READER SERVICE CARD

The Role of Motivation in Computer-Assisted Instruction

Richard P. Swenson and Chrys Anderson

In one of his early (1961) articles, noted Harvard psychologist B.F. Skinner decried the common use of aversive techniques in the classroom. In Skinner's opinion, "The birch rod and cane are gone, but their place has been taken by equally effective punishments (criticism, possible ridicule, failure)...the student must learn, or else!"

Studies in the area of human learning have repeatedly demonstrated that the best teaching methods are those that rely most heavily on positive techniques to motivate people. Since motivation has been identified as a critical component in learning, it makes a great deal of intuitive sense to apply the knowledge we have about motivation to one of the newest and most promising forms of education, instruction via computer, or computer-assisted instruction (CAI).

An essential prelude to a discussion about motivation is an explanation of the role of reinforcement in learning. Reinforcement is a technical term used by psychologists. It refers to any event which follows a behavior and subsequently increases the likelihood that the behavior will occur again. A reinforcer increases the frequency of the behavior it follows.

Good teachers are skilled at identifying and delivering reinforcers in the classroom. For many young children, verbal praise ("Good work!") is a very effective reinforcer. Stars or points to be accumulated and exchanged for some privilege are also useful.

An important aspect of reinforcement is the fact that, by definition, it must be individualized. What is reinforcing to Johnny will not necessarily be reinforcing to Jane. To determine if a suspected reinforcer is effective, it must be tested empirically; it must be validated.

Children prefer to watch a video alligator eat a stick man than see the man escape unscathed.

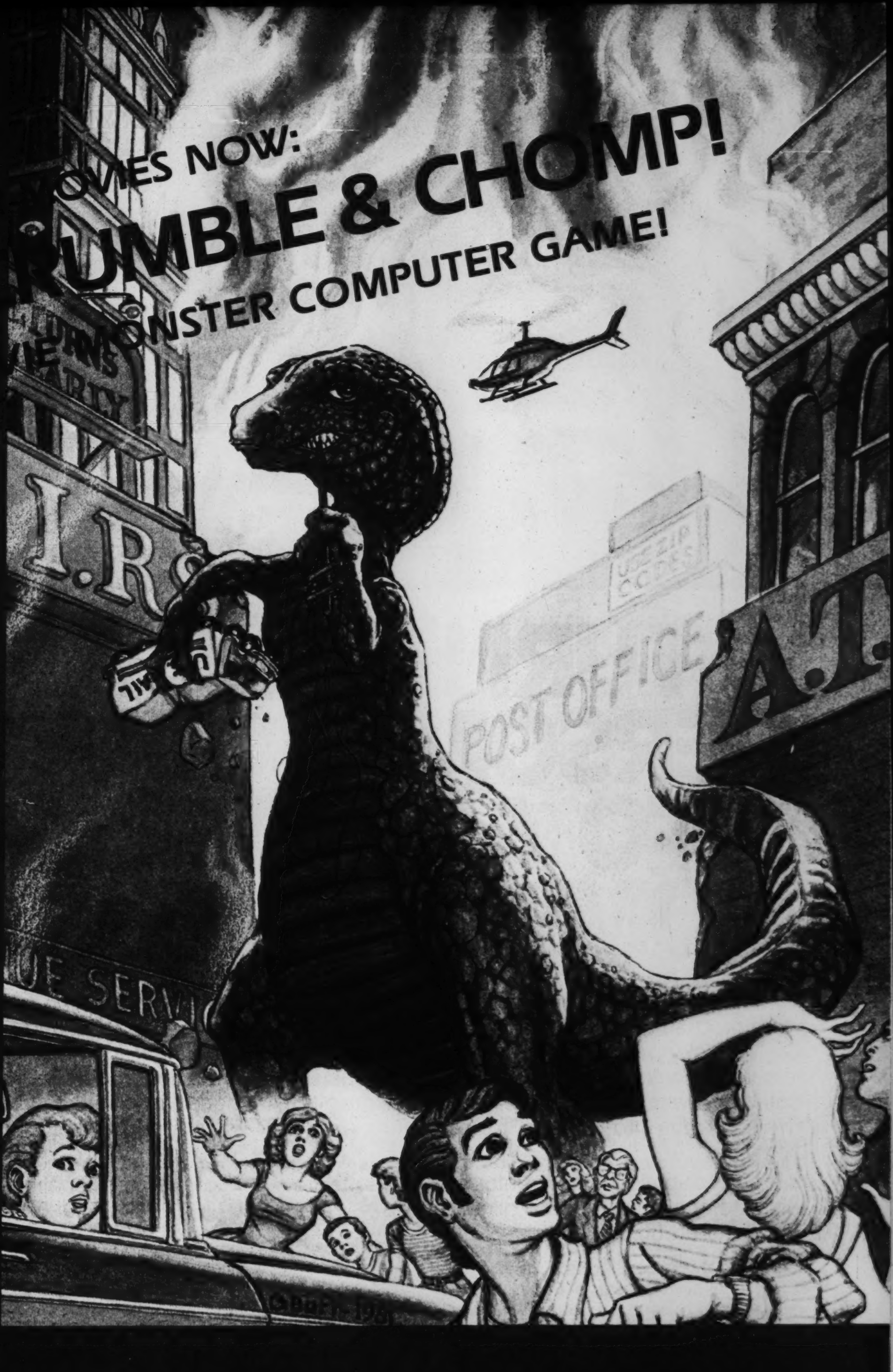
In the design of educational software, the role of reinforcement is too important to overlook. We are aware of two instances in which intrepid programmers created such clever reinforcement routines that they felt no need to validate them. In one case, the feedback routine was designed to send a Snoopy dog parading across the screen with a sign that read "Good job!" Snoopy was programmed to make that entrance whenever a student made a correct response to a question posed by the computer.

If, on the other hand, the student made an incorrect response, Snoopy made his appearance by walking upside down across the top of the video screen, dropping his sign about halfway across. Not too surprisingly, many students deliberately chose wrong answers so they could see Snoopy upside down on the screen, which was much more interesting than the intended reinforcer. The programmer had guessed what the students would "work for"—and guessed wrong.

Similarly, another programmer learned the hard way that children prefer to watch a video alligator eat a stick man than see the man escape unscathed. The lesson to be learned in both cases is the same: a routine is only reinforcing if it works, and the only way to determine if it works is to put it to an empirical test. Since a reinforcement routine which "isn't" can negate an otherwise excellent program, it is clearly worth the time it takes to test it.

Richard P. Swenson and Chrys Anderson, Educational Research, Inc., 44 N. Last Chance Gulch, Helena, MT 59601.

MONSTER MOVIES NOW: CRUSH, CRUMBLE & CHOMP! THE GREAT MOVIE MONSTER COMPUTER GAME!



And guess who stars as the movie monster. You! As any of six different monsters. More if you have the disk version.

You can terrorize and destroy four of the world's largest and most densely populated cities in over 100 possible scenarios. From Tokyo to the Golden Gate, you are the deadliest creature in the air, on the land, or in the sea.

You can be the deadly amphibian who simultaneously smashes street cars, lunches on helpless humans and radiates a ray of death.

If you were a giant winged creature, think of the aerial attacks you could make on the terrified but tasty tidbits beneath you.

But as in all the best monster movies, you're up against everything the human race can throw at you—even nuclear warheads and a strange concoction developed by a team of mad scientists.

For only $29.95 you get 6 stupendous monsters, each with its own monstrous summary card, 4 teeming metropoli displayed in graphic detail on your computer display and mapped in the accompanying 48-page illustrated book, the awesome sounds of monsterly mayhem, and spine-tingling, real-time, edge-of-your-seat excitement.

GET CRUSH, CRUMBLE & CHOMP
now at your local dealer for your APPLE, ATARI,
or TRS-80 . . **before it's too late.**

EPYX
COMPUTER GAMES THINKERS PLAY

CIRCLE 117 ON READER SERVICE CARD

PERSONAL COMPUTER
PROFESSIONAL COMPUTER

TURN YOUR APPLE™ PERSONAL COMPUTER INTO A PROFESSIONAL COMPUTER FOR $750.

The majority of all professional computer software programs available today are written for the CP/M® disk operating system. The SYNERGIZER lets you access all of this vast body of sophisticated software with your Apple II while retaining the capability to access your present Apple software.

In addition to the CP/M interface and software diskette, the SYNERGIZER gives you the required 80 column display and 16K RAM memory expansion boards, the *CP/M Handbook* by Rodnay Zaks, and complete manuals. You get *everything* you need for fast, easy installation and operation in one package.* Each element is designed to complement the others, and everything is designed and produced by the *same* company.

The SYNERGIZER. It'll turn your Apple into a professional computer. And it costs only $750. Phone or write us, or ask your dealer for a SYNERGIZER brochure. Now.

SYNERGIZER™

Manufactured by Advanced Logic Systems,
1195 East Arques Avenue, Sunnyvale, CA 94086, (800) 538-8177 (In California (408) 730-0306)

Apple and Apple II are registered trademarks of Apple Computer, Inc.,
CP/M is a registered trademark of Digital Research, Inc.,
The CP/M Handbook is copyrighted by Sybex, Inc.
And the SYNERGIZER was *our* idea.
***All SYNERGIZER Components are also sold separately.**

CIRCLE 102 ON READER SERVICE CARD

Motivation

From the preceding discussion, perhaps it is obvious that the most important function of reinforcement in a CAI program is a motivational one. It provides the student with a reason to keep learning. But reinforcers differ in kind. Reinforcement is frequently characterized as primary, secondary or generalized.

Primary reinforcers are those which are essentially unlearned and which are almost universally reinforcing. Their motivational properties seem to be inherent so no learning is necessary. Food when hungry, and water when thirsty, are good examples of primary reinforcers. Stimulation, visual or tactile, can also be considered a primary reinforcer.

In terms of the computer, visually stimulating things like "crazy art" (randomly generated flashing lines) perhaps come the closest to fitting the definition of a primary reinforcer. A person apparently need not learn to be entertained by the appearance of visually stimulating material on the screen.

Secondary reinforcers are no less potent motivationally, but they are learned motivators. Praise is the classic example of a secondary reinforcer. It means nothing to a newborn, but most of us, at some point in the course of our socialization, learn to value the praise of others, initially our parents and later other "important persons." An example of a routine using secondary reinforcement on the computer would be one which allowed the user to earn the opportunity to play a video game.

Generalized reinforcers are actually a special class of secondary reinforcers. They require learning as do all secondary reinforcers, but they are general rather than specific. Money is the best example. Money is an extremely powerful reinforcer in our society not because of its intrinsic worth, but because it can be exchanged for things which are valuable (shelter, clothing, food).

On the computer, a generalized reinforcer might be given in the form of a point, star or other marking on the screen. The accumulated points would become valuable if they could subsequently be exchanged for privileges or valued objects.

There are advantages and disadvantages associated with each class of reinforcer. Generalized reinforcers have one big advantage insofar as it is very difficult to satiate or become tired of them. To the extent that they are general (e.g., they can be exchanged for any number of different things), the user does not tire of accumulating them. It is, on the other hand, relatively easy to satiate a person with primary and secondary reinforcers if they are programmed to be delivered at a high rate.

However, the use of generalized reinforcers in CAI has a major disadvantage —the reinforcers are external to the computer. Both secondary and primary reinforcement routines can be totally self-contained. The motivational system is built-in to the computer program. Generalized reinforcers, on the other hand, depend on occurrences totally independent of the machine. True, the computer can reliably deliver the points (or whatever) dependent on a student's response, but it can't see to it that the points are subsequently exchanged for something of value (a grade, praise or money). If the accumulated reinforcers are never exchanged, they will probably lose their reinforcing qualities in a short time.

There are no rules to tell us when to use a particular kind of reinforcement. Experience and knowledge of the results of various studies allow us to make educated guesses about what is likely to be most effective for a given audience.

Reinforcement designed for computer software can also be described along a continuum of "obtrusiveness." As such, it can be passive, active or interactive.

> ***The timing of reinforcement is as important as its occurrence.***

Reinforcement which is passive only delivers information about the adequacy of a user response. For example, a program which presents a new arithmetic problem when the previous one has been correctly answered is passively reinforcing. The user is informed that the response was correct; but nothing else happens on the screen.

Active reinforcement also provides information about response adequacy, but the reinforcement event contains additional information as well. The additional information might be in the form of added visual stimulation (e.g., flashing happy faces) or it might contain elements of positive praise ("Good job, Charlie!").

The critical difference between the two types of reinforcement is the addition of information above and beyond the simple acknowledgement of a correct response. This additional information tells the student that "someone" is pleased and happy about his success.

Interactive reinforcement has all the properties of both passive and active reinforcement, but it adds a new dimension—it allows user participation. A video game which can be played only after the user has made a correct response falls into this category.

To design educational software with highly effective motivational routines, one must first recognize the critical nature of the role of reinforcement and the dimensions along which reinforcers can vary. The next step involves understanding some of the variables which influence the *effectiveness* of the reinforcer. We will limit our examination to four of the most important variables: timing, appropriateness, relevancy, and configuration.

Timing

The timing of reinforcement is as important as its occurrence. In other words, if the timing is off, there is little value in delivering the reinforcer. Chances are very great that an improperly timed reinforcer will actually reinforce something other than the desired response.

To be most effective, reinforcement should occur immediately after the desired response. (In fact, the literature shows that the ideal interval between the response and the reinforcer is .5 seconds.) Initially, the reinforcer should be delivered every time the desired response occurs. This is true whenever an individual is learning a new skill. As the individual gains some experience and knowledge, the reinforcement schedule should be "thinned out"; it should be given less than every time the desired response occurs (e.g., every other time or every fifth time).

Timing is an especially critical variable of reinforcement with important implications for educational software programs. Not only are immediacy and scheduling important factors, but there is an additional temporal element to consider—length or duration of reinforcer. Assuming that the reinforcement event has a discrete beginning and end, how long should it appear on the screen?

There is obviously no simple answer to that question. It depends to a great extent on the type of reinforcement used in a particular program. An interactive reinforcement in the form of a challenging Star Wars-type game can be effective if it is programmed to last several minutes. An active reinforcer such as a happy face or a "good job" message will quickly lose its effectiveness if it appears on the screen for longer than a few seconds.

Appropriateness

Appropriateness of reinforcement is another important consideration. At an abstract level, there is no such thing as an "appropriate" reinforcer; there are simply effective and ineffective ones. At a different level, appropriateness does become an issue.

IT'S TIME KIDS STARTED USING STRONG LANGUAGE.

We encourage it.

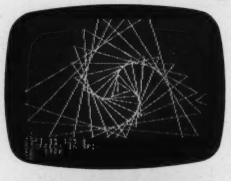
Because now the most powerful educational language is available on the Apple Personal Computer.

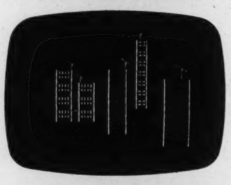
Presenting Apple Logo.

It's not just a programming language for computers, but a learning language for people.

Enough so that anyone, working with Apple Logo, can easily learn the programming principles once reserved for college courses.

Apple Logo encourages you to break problems into small steps, and then shows you how to make those steps automatic.





It does all this interactively.

For instance, if you accidentally type "foreword," instead of forward, Apple Logo responds with "I don't know how to foreword."

There is no such thing as a mistake with Apple Logo, only logical statements telling you what needs to be done to make the program work. So the student programs the computer. Not the computer the student.

And as you learn, Apple Logo learns with you. So whether you're a student of 5 or 55, you'll always be challenged—but not overwhelmed.

Apple Logo runs on the Apple II with 64K. And it comes from Apple, the leading personal computer company in education—with the largest library of courseware at all levels.

Apple Logo. It can make getting to know a computer the most positive of learning experiences.

Your kids will swear by it.

The personal computer.

apple®

For more information, call **(800) 538-9696.** In California, call **(800) 662-9238.** Or write: Apple Computer Inc., 20525 Mariani Avenue, Cupertino, CA 95014.
Apple® Logo is a product of Logo Computer Systems, Inc., 222 Brunswick Boulevard, Point-Claire, Quebec, Canada H9R1A6.

CIRCLE 110 ON READER SERVICE CARD

Role of Motivation, continued...

Before planning any aspect of the motivational routine, a programmer must know the audience for which it is intended. Age of the audience is an extremely important factor. Clearly, what turns a 5-year-old on is unlikely to have much appeal to someone who is 50.

The best information a program designer can have is that stemming from an empirical test. If you really want to determine if a happy face reinforces a 10-year-old, the way to find out is to test as many of them as are willing, able and available. There is no substitute for an empirical test.

Another audience variable which must be considered is nature of disability, if any. For instance, let's look at an educational program geared toward teaching about common anti-epileptic medications and their side effects. The audience in this case would probably be epileptics and parents and professionals who deal with epileptics. It would, then, be clearly inappropriate to design a motivational routine which employed flashing lights or pictures of any sort, since flashing is an environmental condition known to precipitate seizures.

Similarly, materials directed toward students with learning disabilities or autism must be designed specifically for those groups. Autistic children, for example, have been found to "over-react" to certain kinds of visual stimulation and to select irrelevant aspects of a stimulus display when learning.

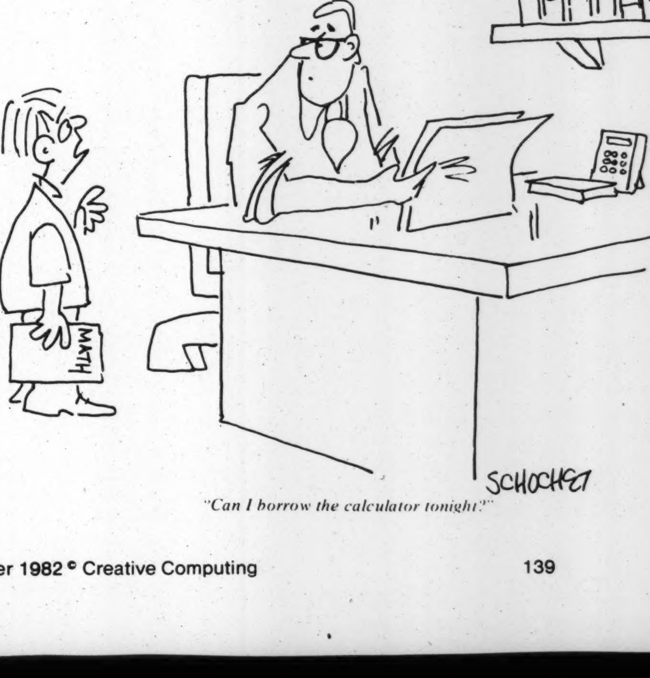
With the learning disabled student, planning is even more complicated since there are so many different disabilities which require unique interventions. The child with dyslexia will have substantially different needs than the child who occasionally reverses digits.

Relevancy

Relevancy of reinforcement is a relatively new consideration stimulated by attempts to design better and better computer courseware. The goal of educational software is to teach concepts and skills in the most expedient way. Research in the areas of psychology and human learning shows that reinforcement is critically important. An individual must be motivated to learn.

The goal of educational software is to teach concepts and skills in the most expedient way.

To be maximally efficient, reinforcement should be not only motivational but informational as well. In other words, the event designed to be reinforced should, if at all possible, also add to the user's information about the subject matter. For example, a word game might be the reinforcer following a lesson in English, or an exciting game routine might require the application of newly-learned math skills.



"Can I borrow the calculator tonight?"

Configuration

When we speak of configuration, we refer to the feedback routine as a whole and not just its reinforcement component. Although it is possible to structure a program to minimize student errors, in most programs students will continue to make several or, perhaps, many errors before they learn the material well enough to make only correct responses.

As long as students continue to make errors, the computer must be programmed to deal with those errors in some way. The psychological literature, and our own years of experience in teaching, point out the need not only to accentuate the positive but also to minimize the negative aspects of feedback. We have drawn the conclusion that as far as incorrect responses are concerned, the less said the better. Of course, the student requires the basic feedback that a given response was incorrect, but any additional, judgmental information is not only unnecessary but undesirable.

By this time, it should be increasingly clear that developing sound motivational routines for educational software is a complicated and challenging proposition. There are no simple rules of thumb, no universal truths. There have been many studies done in the unending attempt to discover how and why people learn, and some of those findings have been summarized above. Two final points are in order, however, before we conclude this discussion.

Psychologists have long talked about an "inverted U-shaped curve" of motivation. In so doing, they refer to the relationship between the speed of learning and the strength of a given motivator at a given time. As the incentive or motivation becomes more compelling, an individual's rate of learning will improve...up to a point. Beyond that point, performance will actually be hindered.

This makes a great deal of intuitive sense if you think of the increasing pressure on an individual to respond correctly. At a certain level, the pressure becomes too great—too much hinges on his response. Elements of anxiety begin to enter the picture and performance begins to deteriorate correspondingly. In the design of educational software, then, you can have too much of a good thing.

This brings us up to the second and final point. There is a danger that reinforcement routines can be distracting. Two minutes of shooting down planes on the screen as a reward for an instructional segment completed may put the student into a different mood that is detrimental to efficient learning. Once again, the best way to determine the optimal circumstances for learning using the computer is the empirical test. There is no substitute. □

How To Solve It-With The Computer

International Computer Problem Solving Contest II Results

Donald T. Piele

Devising a computer problem solving contest for the growing crop of young, talented computer problem solvers becomes more difficult each year. The problem is this: How do you create a set of five programming problems that will keep a team of three computer whiz kids busy for two hours and at the same time not be a frustrating experience for a beginning team?

Last spring Tim Fossum, a colleague at the University of Wisconsin-Parkside, and I faced this problem for the sixth consecutive year. In each of the three divisions; elementary grades (4-6), junior (grades 7-9), and senior (grades 10-12), we created a set of five computer problem questions. All three sets appeared last month in this column and interested readers were invited to solve them. This month, as promised, we present a complete set of solutions to all 15 problems (five for each division) along with an announcement of the top teams in each division.

Elementary Division

At the request of several local contest directors, we agreed to experiment with an elementary division this year for stu-

Figure 1. *Elementary Division Winners*

Place	Team/Member Names	Advisor/School
1	Apple Maniacs Nick Wilt Jason Hagen	M. Kinney Park Road Elementary School Pittsford, NY 14534
2	The System Crashers Paula Rickert Ethan Magdovitz Urjeet Patel	R. Grierson The Latin School of Chicago 59 W. North Blvd. Chicago, IL 60610
2	Nether-Providence M.S. Erik Grisson Mike Vartanian	N. Rader Wallingford-Swathmore School D. 200 S. Providence Rd. Wallingford, PA 10986
2	Jackson Kenny Hempstead Mike Parr Paul Franklin	B. Davis Morgan Hill Unified S.D. P.O. Box 927 Morgan Hill, CA 95037
2	Rotton Apples Bill Childs Tim Kokesh	G. Stallings Bartlesville Association of Computer Hobbyists 1406 Macklyn Lane Bartlesville, OK 74003

Donald T. Piele, University of Wisconsin-Parkside Box 2000, Kenosha, WI 53141.

Radio Shack's new Color LOGO helps them use the most powerful processors in the world...

...their own minds.

Our remarkable new Color LOGO programming language and a TRS-80® Color Computer will enable children to make a myriad of discoveries. Color LOGO will pique curiosity, and excite young minds. Students will welcome each new challenge. And to welcome the challenge is the secret to learning.

A Language for Learning. The Color LOGO language is designed to help students grasp graphic relationships. It's easy to learn and fun to use. Through manipulation of "turtle" graphics, students learn to program. The benefits? The computer becomes a friendly learning tool, and students gain valuable insight into advanced concepts.

Something for Everyone. Children who haven't yet begun to read can use a "doodle" mode to create their own graphics. And a "hatch" command creates multiple turtles, capable of running separate programs simultaneously — a fascinating programming concept for students of all ages.

Low Cost Makes It Ideal for Classroom Use. Similar programming languages are expensive to implement because they require very large amounts of memory. But not Radio Shack Color LOGO. Our disk version is just $99. It requires only the $649.95 32K Extended BASIC Color Computer and a $599 Color Disk Drive. And we have a Program Pak™ (ROM) version that's soon to be available. It will require only our $399.95 16K Color Computer. Use your own color TV with either version. Both include an excellent instruction manual with lessons and programs for both the beginner and advanced user.

Discover the World of Color LOGO. Stop in today at a Radio Shack Computer Center, store or participating dealer near you.

For the name of the full-time educational coordinator in your area, call Radio Shack's Education Division at 800-433-5682 toll-free. In Texas, call 800-772-8538.

Radio Shack®

The biggest name in little computers™

A DIVISION OF TANDY CORPORATION

Retail prices may vary at individual stores and dealers.

CIRCLE 254 ON READER SERVICE CARD

ViViViViViViViViViVidex INC. TM

897 N.W. Grant Ave. • Corvallis, Oregon 97330 • 503/758-0521

Never having to type the word "CATALOG," or trying to remember how to get from one part of a program to another!

If you could do these functions, and many more like them, at the STROKE of a SINGLE KEY, would you? We thought you would! So, we invented the Enhancer][and the Function Strip. More than just another lower case adapter, the Enhancer][is an intelligent keyboard processor. Now characters, strings of data, commands and statements can all be stored in your Enhancer][for immediate recall by pressing JUST ONE KEY!

Features that you would expect only on larger systems now can be yours. EASILY! For instance, wouldn't you like auto-repeat, and hi-speed repeat? How about a type-ahead buffer? Even user-definable function keys are available for greater input flexibility.

The Videx Enhancer][and Function Strip; it really is the Dawn of a New Era for Apple][™.

Suggested Prices	
ENHANCER][	149.00
FUNCTION STRIP	79.00
Package Deal	215.00

NEC
Videx
Enhancer II
INTELLIGENT INTERFACE
FUNCTION STRIP
apple II
disk II

Apple][is a registered trademark of Apple Computer, Inc.
Enhancer][and Function Strip are trademarks of Videx, Inc.

CIRCLE 297 ON READER SERVICE CARD

Place	Team/Member Names	Advisor/School
2	Apple Peelers	G. Stallings (same as above)
2	Apple Eaters Roland Dreier	E.J. Romer Princeton Day School Box 75 Princeton, NJ 08540
3	Richard Schossberg Kevin Blackman	G. Ropes Rippowam-Cisqua School Box 488 Bedford, NY 10506
3	Peter Thomas Ian Tholl	B. Thomas Washington Apple PI P.O. Box 34511 Bethesda, MD 20817
3	The Random Mathew Zimmer Scott Leban Lang Ambrose	D. Reilly Norfolk Academy 1585 Wesleyan Dr. Norfolk, VA 23502
3	The Computer Artists Steven Dollins Richard Langston	A. Dollins The Micro Computer Center 1409 Terrace Dr. Pittsburgh, PA 15228
3	Lone TRS Shack-Man Barry Brown	J. Brown Harding Academy Box 775 Searcy, AR 72143
3	Denmark Dennis Hall Marc Majcher	Fairport Central 38 West Church St. Fairport, NY 14450
3	JAS Jeff Chrisope Andy Lorenz Steve Gray	D. Stranger CAPS Project Rochester Public School Rochester, MN 55901
Honorable Mention:		
	The Mirman School	Los Angeles, CA
	Blessed Sacrament	Morton, IL
	American School in London	London, England
	MSD Washington Township	Indianapolis, IN
	Orchard Lake Middle School	West Bloomfield, MI

dents in grades 4 through 6. We were surprised to discover that over 118 teams at 46 contest sites participated officially.

First place in the elementary division went to the Apple Maniacs, Nick Wilt and Jason Hagen, from Park Road Elementary School in Pittsford, NY. They were the only team to solve all five problems successfully. The contest director was Margaret Kinney, a parent volunteer who teaches programming at two of the Pittsford Schools.

Second place was shared by six teams who solved four problems very well, and third place was shared by eight teams who also solved four but not without some difficulty. Several schools were also cited for honorable mention. The complete rankings appear in Figure 1.

Junior Division

We received the results from 307 teams in 83 local contest sites in the junior division. Top honors went to The Two Charlies, a team consisting of Charles Tsai and Chuck Williamson from Salem. Their advisor, Harold Snyder, reports that both

BUSINESS OPPORTUNITY

Service & Maintain Coin Operated Micro-Computers In Libraries

●

DEALER REPRESENTATIVES WANTED PART OR FULL TIME

●

NO ROYALTIES, NO FRANCHISE FEE

●

Exceptionally lucrative ground-floor opportunity to participate in the explosive Micro-Computer Market. The Computer Bus offers Community minded Micro-Computer owners the chance to develop their own successful business within a relatively short period of time with this innovative Microcomputer concept. The prognosis for success has never been better.

If you are accepted as a Computer Bus "Learning Center" Dealer you will operate your own sales and rental business from your home or office, featuring a product line of uncompromising quality and outstanding company support.

Investment required $3,000, secured by extensive computer software and hardware Selected territory, leads, national and regional advertising, technical support and full back-up service.

For additional information call toll free
1-800-321-3670
Ohio Residents Call Collect
1-216-255-1617

the COMPUTER BUS
personal & business - computer systems

the COMPUTER BUS, 101 River St., Grand River, Ohio 44045
Authorized ATARI® Dealer

CIRCLE 137 ON READER SERVICE CARD

boys are outstanding students and very active in the Continental Mathematics League and the Atlantic-Pacific Mathematics League contests.

Charles Tsai, a freshman at South Salem High School last year, had the top individual total score during the year for his school. He has his own TRS-80 at home and programs in Basic and machine language.

Chuck Williamson was an eighth grader at Leslie Middle School, next door to South High, which made it convenient for him to take honors geometry at South High while still in junior high. Chuck uses an Apple II at home but during the contest The Two Charlies used a SOL computer and wrote their programs in Microsoft Basic.

Second and third place honors were awarded to eight other teams. All of these teams solved all five problems. The complete list of winners appears in Figure 2.

Figure 2. *Junior Division Winners*

Place	Team/Members	Advisor/School
1	The Two Charlies Charles Tsai Chuck Williamson	Harold Snyder South Salem H.S. 2405 Saginaw St. Salem, OR 97302
2	Pet People Mark Knutsen Glen Whitney	M. Monaco / K. Warner Abraham Clark H.S. 122 E. 6th Ave. Roselle, NJ 07703
3	Apple Core Dwight A. Lee Eric Brand Andrew Williams	Rich Rozychi Rolling Meadows H.S. 2901 Central Rd. Rolling Meadows, IL 60008
3	File Types Stephen Schmidt Dan Shafer Jonathan Johnson	Bruce Campbell The Prairie School 4050 Lighthouse Dr. Racine, WI 53402
3	The Bucketheads Larrson Ullman	Joseph Hofmeister Cincinnati Country Day School 6905 Gwen Rd. Cincinnati, OH 45243
3	Compu-Tigers Anton Rang Don Greene	Don Schultz New Richmond M.S. New Richmond, WI 54017
3	Nodules Josh Millard Jason Finn Mike Selinker	L. Kashner / D. Fredrickson South Shore M.S. 8875 Rainier Ave. Seattle, WA 98118
3	David Franklin Dan Schwartz	Susan Fleig Georgetown Day School 4530 MacArthur Blvd. Washington, D.C.
3	Ferrandopulle Koh	Doug Lewis Gilman School 5407 Roland Ave. Baltimore, MD

Senior Division

As usual the senior division was the most popular. Results from 586 teams were reported from 147 contest sites. First place in the senior division went to the team of Spencer Greene and Truman Joe of Klein High School in Spring, TX. Their school adviser, Josie Mallery, said both are talented academically and shine particularly in mathematics.

Spence, a sophomore, and Truman, a junior, both have Apple II computers at home and write programs in Basic and assembly language. Both boys compete regularly in mathematics competitions and Spence is preparing for the Mathematics Olympian sponsored by the National Council of Teachers of Mathematics.

They correctly solved all five problems on an Apple II computer. Second place went to the Return of The Electronic Imbroglio, a team from Cambridge Rindge and Latin School in Cambridge, MA.

Eight teams finished in third place. Each team solved all five problems with varying degrees of ease and style. The complete list of winners appears in Figure 3. ●

Overall Results

On the surface it might appear that this year's contest problems were too easy since so many junior and senior division teams solved all five problems. But in fact it turned out to be just about right since only 1.7% of the senior teams and 3% of the junior teams solved all five problems. The average number of problems solved (out of five possible) was 1.6 in the senior division and 1.3 in the junior division.

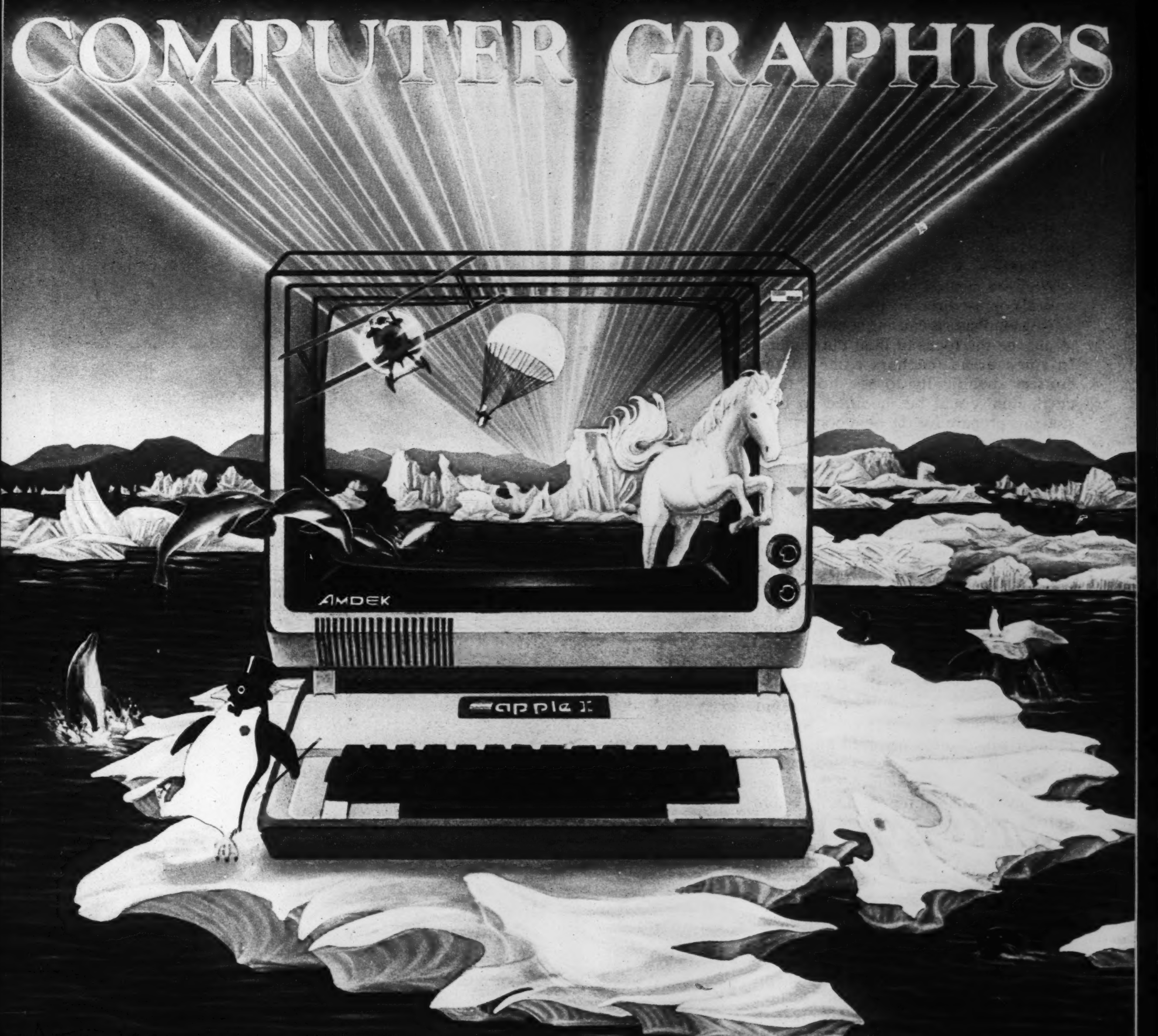
It appears that the gap between the experienced teams and the beginning teams is getting wider as microcomputers become commonplace in elementary and secondary schools across the country. The few schools that have been involved with microcomputers for several years are beginning to see the results of providing talented kids access to computers.

The level of difficulty for each contest problem can be judged by observing the frequency with which the problem was solved during the contest. This number appears as a percentage in Table 1. Thus a low value means the problem was more difficult.

Focus

One of the reasons that we continue to create the problems for this programming contest is because it is fun and a challenge. From the feedback we get from local contest directors, this is the same reason their students enjoy entering the contest.

The problems we select require a combination of skills: 1) Good control of a programming language—every problem can be solved using standard Basic (All of the teams which were ranked this year used Basic. Advisors of the few teams that used Pascal reported a severe handicap because of the time needed to compile the program and the string handling limitations); 2) The ability to solve problems in general; 3) Experience in implementing a problem solving strategy within the context of a computer language.



for the Artist

Special Effects

by David Lubar and Mark Pelczarski

Paint on your computer in over 100 colors with 96 different brushes! Magnify mode for precision touch-ups; mirror image; color reverses; move any part of picture anywhere; packing routine for increased disk storage of any standard graphics screen. Can be used by anyone. Paddle/joystick $39.95. Apple Graphics Tablet $69.95.

for the Designer

THE COMPLETE GRAPHICS SYSTEM II

by Mark Pelczarski

Everything needed for computer-aided design. Easily draw and design in two or three dimensions, mix text and graphics freely, define shapes and create typefaces with unique character generator. Great for presentations, videotape displays, storing designs on disks, graphics for other programs, or just for experimentation. Paddle/joystick $69.95, Apple Graphics Tablet $119.95. 50 additional fonts, $19.95.

for the Programmer

The Graphics Magician

by Mark Pelczarski, David Lubar, and Chris Jochumson

Add fast, smooth animation and hundreds of pictures to your programs. Create animated shapes and draw paths; have up to 32 independently controlled figures on screen. Use a special palette of over 100 colors to create pictures and objects in highly compressed format. Easy to use, and includes a special programming tutorial. Has saved months in development time for several games already on the market. Paddle/joystick $59.95, Apple Graphics Tablet $69.95.

penguin software 830 4th Avenue, Geneva, Illinois 60134 (312) 232-1984

All Penguin applications products are now on unprotected disks for your convenience. Apple II is a trademark of Apple Computer, Inc.

CIRCLE 238 ON READER SERVICE CARD

How to Solve It, continued...

The problems we use are generally classified as:

1) Words: Searching/sorting, replacing, rearranging, modifying.
2) Numbers: Multiple precision arithmetic, special properties.
3) Simulations: Simple games or experiments.
4) Print Graphics: Designs that can be printed out.
5) Puzzles

We were pleased to hear reports from several contest directors that our problem solving emphasis is causing some advisors to change the focus of their curriculum. In some areas teachers came to the contest specifically to see how their curriculum could be modified to help students prepare for the next contest.

Conclusion

It has never been the intention of this contest to glorify the winning team or the concept of winning in general. There is no trip to Disneyland or free microcomputer for the winning team. The top team in each division simply has their names and the name of their school engraved on a traveling silver trophy which they can keep for one year.

Most of the recognition involved with this contest comes at the local level. Several directors sent us newspaper stories describing the outcome of the local contest which often involved an awards presentation and sometimes even a dinner. Providing this kind of recognition can only be done at the local level where getting your name printed in the local newspaper is always a thrill.

Finally, our congratulations go to each student who participated this year. Only one team, of course, can "win" in the sense of being ranked first in its division. But from what we saw in the returns, there are many young students who are winners all over the world. These students have demonstrated their ability to take on a difficult challenge and give it their best shot.

Post Script

Next year's contest will be held on Saturday, April 30, 1983. Schools that cannot hold the contest on this date will be allowed to hold the contest on Friday, April 29. In order to continue organizing and printing the contest, a small fee of $2 will be charged to each local contest site within the United States.

Foreign countries will be charged $5, the extra amount needed to cover postage. All funds will be used to support the contest. Complete details will be announced in this column in January. Interested parties who write for information should include a stamped self-addressed envelope. Send to: Dr. D.T. Piele, Box 2000, University of Wisconsin-Parkside, Kenosha, WI 53141. Everyone who participated in last year's contest will automatically receive an entry form in January.

Figure 3. *Senior Division Winners*

Place	Team/Members	Advisor/School
1	Spencer Greene Truman Joe	Josie Mallery Klein High School 16715 Steubner Airline Rd. Spring, TX 77373
2	Return of The Electronic Imbroglio	Elizabeth Griffiths Cambridge Rindge & Latin S. 459 Broadway St. Cambridge, MA 02138
3	Team #1 Ryan McGuire Tom Kreyl Tom White	David Dussault Livonia H.S. Big Tree St. Livonia, NY 14487
3	Mash 1 Rick Bouchard Mike Grier Norm McClarkin	Milford Area Senior H.S. West St. Milford, NH 03055
3	Elmira Lancers Glenn Bauman Jim Kuhn Dave McClarkin	J. Galbraith/ R. Clausi Elmira Secondary School Elmira, Ontario, Canada
3	SR. #1 Russell Gehr Mark Lindell Robert Schapire	Philip Gibbons Bethlehem Central H.S. Delmar, NY 12054
3	Team A	G. Peddle North York Board of Education Downsview, Ontario, Canada
3	Team A	Joseph Reger Ben Gurion University Beer Sheva, Israel
3	Romulus Peter Cherna Edward Lam Aurum Washawsky	Ian Hodgson Wager H.S. Cote St. Luc Quebec, Canada
3	Team A Brian Kelley Elmo Peele	Ava Crum Winfield High School Winfield, WV 25213

Table 1. *Frequency Distribution*

Problem Number	Elementary	Junior	Senior
1	40%	15%	39%
2	5%	23%	14%
3	22%	25%	19%
4	15%	26%	25%
5	18%	11%	3%
Average number of problems solved by all teams.	1.7	1.3	1.6

Interested in the IBM Personal Computer?

PC
The Independent Guide to IBM Personal Computers
Volume 1, Number 3
$3.00
WANT TO SELL YOUR
SEE P. 72
GARY KILDALL
The Man Who Created CP/M
IBM Announces CP/M-86
WordStar Released
Baby Blue, Using Data Files, FORTH, Hundreds of New Products
PLUS: Adam Osborne & David Bunnell tell you how NOT to buy a Micro
IBM

If you're interested in the IBM Personal Computer then you need PC magazine. PC magazine is the Independent Guide to IBM Personal Computers. Each issue is packed with information for everyone interested in IBM Personal Computers.

PC magazine tells you how to put together the best IBM "PC" system and then how to get the most out of it. Each issue brings you hundreds of colorful pages of evaluations, insights, and straight talk from respected experts—professionals in computer science as well as writers, businessmen, lawyers, educators, and many others.

PC covers software, hardware, applications and most every topic of importance to the thousands of IBM Personal Computer users who read it. To ensure that we give you the information you need, PC includes a special "User-to-User" section, as well as a "PC Wish List", and news about IBM Personal Computer clubs, events and publications.

For a limited time, you can subscribe to PC at NO RISK and still receive a 25% discount off the newsstand price. Enter your subscription now. If not fully satisfied when you receive your first copy of PC, simply return your mailing label within 15 days for a full refund.

This is the magazine that tells you all about it.

PC
The Independent Guide to IBM Personal Computers

Name ________________

Address ________________

City ________ State ______ Zip ______ **C**

☐ 6 issues/$14.50 ☐ 12 issues/$27.00 ☐ 24 issues/$46.00

☐ Check enclosed ☐ VISA ☐ MasterCard ☐ Bill me

Card # ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ expires ______

☐ I already own an IBM "PC" ☐ I am thinking about buying one

Dept. C.
PC Magazine
1528 Irving St.
San Francisco, CA 94122

Phone Credit Card Orders to:
(Toll Free Number)
California: 800/792-0990, ext. 1136
All Other States: 800/227-3800, ext. 1136

CIRCLE 234 ON READER SERVICE CARD

Your VIC 20 never had it so good!

HES
HES MON
By Terry Peterson
HESMON
Cartridge for VIC 20
HES MON
HES
HES MON
HES
HesGames
Features:
Easy to Run
User-Friendly Games
Dazzling Colorful Graphics
Wonderful Sound effects
HES
Victrek & Victrek 8K
Cassette for VIC 20

VIC 20 owners rejoice! HES presents a complete range of software from our exciting series of games to our professional group of utility and language programs.

Our new cartridge programs include: HES MON, an indispensible monitor for assembly language programmers; HES WRITER, a word processing program; Turtle Graphics, a fun and easy way to learn computer programming; and VIC FORTH, a powerful language that is many times faster than BASIC, yet easier to use than assembly language.

HES is committed to offering high-quality, well-documented computer programs on a continual basis. Look for our cartridge and cassette based software at your local dealer.

HES

Human Engineered Software
71 Park Lane
Brisbane, California 94005
Telephone 415-468-4110

CIRCLE 304 ON READER SERVICE CARD

1982 Contest Solutions

The solutions listed below represent some of the best efforts of the top ten teams in each division of the 1982 contest. All of the solutions were written in Applesoft Basic to run on the Apple II computer—the computer most commonly found in schools. □

```
 1 '     Elementary Problem #1
 2 '     LETTER HOME
 3 '     *********************
10 INPUT "INPUT THE NICKNAMES YOU GIVE YOUR GUARDIAN(S): ";A$
20   INPUT "INPUT A NUMBER: ";B$
30     INPUT "INPUT A KIND OF FOOD: ";C$
40      INPUT "INPUT ANOTHER NUMBER SMALLER THAN THE FIRST: ";D$
50     IF VAL(D$)>VAL(B$) THEN 40
60   INPUT "INPUT YOUR NAME: ";E$
70 '     ********************
75 '
80 PRINT: PRINT "DEAR ";A$
90 PRINT
100 PRINT "THE $";B$;" YOU GAME ME FOR SPENDING MONEY AT CAMP IS"
110 PRINT "GONE. I SPENT MOST OF IT ON ";C$;". DO YOU THINK YOU "
120 PRINT "COULD SEND AN EXTRA $";D$;"? THINKING OF YOU OFTEN."
130 PRINT
140 PRINT "                             LOVE, ";E$

INPUT THE NICKNAMES YOU GIVE YOUR GUARDIAN(S): MOM AND DAD
INPUT A NUMBER: 15
INPUT A KIND OF FOOD: SNACKS
INPUT ANOTHER NUMBER SMALLER THAN THE FIRST: 12
INPUT YOUR NAME: NICK

DEAR MOM AND DAD

THE $15 YOU GAME ME FOR SPENDING MONEY AT CAMP IS
GONE. I SPENT MOST OF IT ON SNACKS. DO YOU THINK YOU
COULD SEND AN EXTRA $12? THINKING OF YOU OFTEN.

                              LOVE, NICK
```

```
 1 '     Elementary Problem #2
 2 '     SECOND THOUGHTS
 3 '     *********************
10 PRINT "WHEN YOU ENTER TIMES, INPUT THEM IN HOURS,MINUTES,SECONDS
20 PRINT "SEPARATING THE NUMBERS WITH COMMAS(,).
30 PRINT
40 INPUT "WHAT TIME DID YOU GO TO BED? :";A,B,C
50 INPUT "WHAT TIME DID YOU GET UP?    :";D,E,F
60 PRINT
70 G=A*60*60+B*60+C                 'G-seconds from Noon to bedtime.
80 J=3600*12 - G                    'J= seconds from bedtime till midnite.
90      IF D=12 THEN H=E*60 +F      'H=seconds from midnite to wakeup.
100     IF D<>12 THEN H=D*60*60+E*60+F
105 '
110     T=J+H                       'T= total time in seconds.
120   PRINT "YOU SLEPT FOR ";T;" SECONDS."
130 END

WHEN YOU ENTER TIMES, INPUT THEM IN HOURS,MINUTES,SECONDS
SEPARATING THE NUMBERS WITH COMMAS(,).

WHAT TIME DID YOU GO TO BED? : 10 , 45 , 32
WHAT TIME DID YOU GET UP?    : 7 , 34 , 47

YOU SLEPT FOR  31755  SECONDS.

WHAT TIME DID YOU GO TO BED? : 2 , 0 , 0
WHAT TIME DID YOU GET UP?    : 12 , 1 , 1

YOU SLEPT FOR  36061  SECONDS.
```

```
 1 '    Elementray Problem #3
 2 '    STAR TRACKS
 3 '    **************************
10 FOR I=1 TO 5
20   FOR J= 1 TO I
30     PRINT TAB(10-I);" *";
40   NEXT J
50   PRINT
60 NEXT I
70 END

         *
        * *
       * * *
      * * * *
     * * * * *
```

```
 1 '    Elementary Problem #4
 2 '    EGG TOSS
 3 '    **********************
10 FOR I = 1 TO 6
20    X=RND(1)
   ' X = random number
  between 0 and 1.
30    IF X < .2 THEN 100
40      PRINT "GOOD ";
50 NEXT I
60    PRINT "YOU WIN! "
70 END
90 '
100 PRINT "SPLAT! "
110 END
SPLAT!
GOOD SPLAT!
GOOD GOOD GOOD SPLAT!
SPLAT!
GOOD GOOD GOOD GOOD GOOD
GOOB YOU WIN!
```

```
 1 '     Elementray Problem #5
 2 '     WORDS WORTH
 3 '     **********************
10 INPUT "ENTER A WORD ";W$
20 PRINT
30 FOR I=1 TO LEN(W$)
40   L$=MID$(W$,I,1)
50   L =ASC(L$)-64
60   PRINT L$,
70     IF L<10 THEN PRINT " ";
80       PRINT L
90     S=S+L
100 NEXT I
110 PRINT
120 PRINT "THE WORTH OF THE WORD
   ";W$;" IS";S;"."

ENTER A WORD PRICELESS

P              16
R              18
I               9
C               3
E               5
L              12
E               5
S              19
S              19

THE WORTH OF THE WORD PRICELESS
IS 106 .

ENTER A WORD WORTHLESS

W              23
O              15
R              18
T              20
H               8
L              12
E               5
S              19
S              19

THE WORTH OF THE WORD WORTHLESS
IS 139 .
```

```
 1 '     Junior Problem #1
 2 '     TRIANGULAR DESIGN
 3 '     ******************
10 INPUT "NUMBER OF ROWS = ";N
20    FOR R=1 TO N  ' R = ROW
30   X=R-10*INT(R/10) 'X = R MOD 10
40         PRINT TAB(N+1-R);
50   FOR C=1 TO 2*R-1 'C = COLUMN
60          PRINT X;
70          IF C<R THEN X=X+1
80          IF C>=R THEN X=X-1
90          IF X>9 THEN X=0
100         IF X<0 THEN X=9
110        NEXT C
120     PRINT
130    NEXT R
140 END
```

How to Solve It, continued...

```
NUMBER OF ROWS =  7
      1
     232
    34543
   4567654
  567898765
 67890109876
7890123210987
```

```
NUMBER OF ROWS =  14
             1
            232
           34543
          4567654
         567898765
        67890109876
       7890123210987
      890123454321098
     90123456765432109
    0123456789876543210
   123456789010987654321
  23456789012321098765432
 3456789012345432109876543
456789012345676543210987654
```

```
1 ´    Junior #2
2 ´    FRACTION SORT
3 ´    *************
10 DIM N(100), D(100), F(100)
20 I=1
30 READ N(I),D(I)
40   IF D(I)=0 THEN 100
50   F(I)=N(I)/D(I)     ´F=Fraction
60   I=I+1 : GOTO 30
90 ´ ***************
100 N=J -1 ´Number of fractions
110 M=100
120   FOR J=1 TO N
   ´Put in ascending order
130      IF F(I)<M
   THEN M=F(I) : P=I
140   NEXT I
150 IF M>99 THEN END
160    PRINT N(P);"/";D(P)
170    F(P)=100   ´
180 GOTO 110
200 ´************
210 DATA 1,2
220 DATA 3,4
230 DATA 1,3
240 DATA 23,28
250 DATA 2,9
260 DATA 0,0
```

```
    2/9
    1/3
    1/2
    3/4
    2/2
```

```
1        Junior #3
2 ´      TENNIS GAME
3 ´      ***********
10 INPUT "NUMBER OF GAMES = ";N
20 INPUT "% CHANCE ´A´
   WINS A POINT : ";P
30 PRINT
40   FOR I=1 TO N
50     A=0 : B=0
   ´ A,B = Points for A and B
60     X = RND(1)
70     IF X < P/100 THEN PRINT
       "A";:A=A+1:GOTO 100
80       PRINT "B"; : B=B+1 :
         GOTO 120
100    IF A >= 4 AND A >= B + 2
       THEN PRINT " (A)": TA=TA +1
       : GOTO 150
110      GOTO 60
120    IF B >=4 AND B >= A + 2
       THEN PRINT " (B)" : GOTO 150
130      GOTO 60
150  NEXT I
160    PRINT
170  PRINT "PLAYER ´A´ WON ";TA;"
     GAMES OUT OF ";N
180  END
```

```
NUMBER OF GAMES =  10
% CHANCE ´A´ WINS A POINT :  55

BAABBB (B)
ABABABBB (B)
AABAA (A)
BBBAAAAA (A)
BAABABAA (A)
BBBB (B)
AAAA (A)
BABAAA (A)
ABBABB (B)
ABBBAB (B)
PLAYER ´A´ WON  5
GAMES OUT OF  10

NUMBER OF GAMES =  10
% CHANCE ´A´ WINS A POINT :  60

AAAA (A)
ABABAA (A)
ABAAA (A)
BBBB (B)
BABAAA (A)
BAAAA (A)
AABABBABABBAAA (A)
BBBB (B)
ABBBAAAA (A)
BABBAABABB (B)

PLAYER ´A´ WON  7  GAMES OUT OF  10
```

```
1 ´     Junior Problem #4
2 ´     VERTICAL HISTOGRAM
3 ´     ******************
10 C = 0
20 READ X
30   IF X=0 THEN 70
40    IF X<0 OR X>9 THEN 20
50    A(X)=A(X)+1
60 GOTO 20
70 FOR X=1 TO 9
80   IF M<A(X) THEN M=A(X)
   ´M = max heisth
90 NEXT X
100 FOR G = M TO 1 STEP -1
110  FOR X=1 TO 9
120   IF A(X)<G THEN PRINT "  "
      ;: GOTO 140
130     PRINT "* ";
140  NEXT X
150  PRINT
160 NEXT G
170   PRINT "1 2 3 4 5 6 7 8 9"
180 END
999 ´ *************************
1000 DATA 1,7,2,9,13,6,7,1,3,7,5,
         7,9,0
```

```
            *
            *
*           *   *
* * *   * * *   *
1 2 3 4 5 6 7 8 9
```

```
1 ´    Junior Problem #5
 ´   AUTOMATED INFLATION
3´     ********************
10 INPUT "% INCREASE = ";C
20 READ A$
30   IF A$="*END*" THEN END
40      A$=A$+" "
50    FOR I=1 TO LEN(A$)
60      S=ASC(MID$(A$,I,1))
70      IF S<48 OR S>57 THEN 220
90 ´ ***************************
100 X=I : P=0
110 P=P+1
130 S=ASC(MID$(A$,X+P,1)
140   IF S>47 AND S<58 THEN 110
150 ´***************************
160   P$=MID$(A$,X,P)
170   W=VAL(P$)
180   W=W*(1+C/100)
190   W=INT(100*W+.5)/100
200     Q$=STR$(W) :
    B$=LEFT$(A$,X-1) +Q$ +
    RIGHT$(A$,LEN(A$)-P-X+1)
210   A$=B$ : I=I+LEN(Q$)
220 NEXT I
230 PRINT A$
240 GOTO 20
250 ´ ************************
260 DATA "OLD MACDONALD´S 7 COWS
    GAVE 120 POUNDS OF MILK TODAY."
270 DATA "THEY WILL COME HOME AT
    4 P.M."
280 DATA "*END*"
```

```
% INCREASE = 12
OLD MACDONALD´S 7.84 COWS GAVE
134.4 POUNDS OF MILK TODAY.
THEY WILL COME HOME AT 4.48 P.M.

% INCREASE = 15
OLD MACDONALD´S 8.05 COWS GAVE 138
POUNDS OF MILK TODAY.
THEY WILL COME HOME AT 4.6 P.M.
```

```
1 ´    Senior Problem #1
2 ´    VERTICAL HISTOGRAM
3 ´    ******************
10 DIM X(25)
20 READ A$
30   IF A$="*END*" THEN 80
40   FOR N=1 TO LEN(A$)
50     Y=ASC(MID$(A$,N,1))-65
55     IF Y<0 OR Y>25 THEN 70
60     X(Y)=X(Y)+1
65      IF X(Y)>MAX THEN MAX=X(Y)
70   NEXT N
75 GOTO 20
80 ´********************
85 FOR N=MAX TO 1 STEP -1
90   FOR Q=0 TO 25
100   IF X(Q)<N THEN PRINT "
      ";:GOTO 120
110   PRINT "*";
120  NEXT Q
125 PRINT
130 NEXT N
140 ´*******************
150 FOR I=1 TO 26
160   PRINT CHR$(64+I);
170 NEXT I
200 DATA "THE QUICK BROWN FOX
    JUMPED OVER THE LAZY DOG."
210 DATA "THIS IS AN EXAMPLE OF HOW
220 DATA "TO TEST YOUR HISTOGRAM
    PROGRAM. YOU"
230 DATA "CAN USE THIS EXAMPLE."
500 DATA "*END*"
```

```
              *
    *         *
    *         *
    *         *    *
*   *         *    *
*   *  *      *  ***
*   *  **   * *  ****
*   *  **   * ** ****
*   * *** ***** ****  **
* *******  ***** **** ***
**************************
ABCDEFGHIJKLMNOPQRSTUVWXYZ
```

```
1 ´    Senior Problem #2
2 ´    FIFTEEN
3 ´    *****************
10 INPUT "ENTER A STRING OF 5 DIGITS
   : ";A$
15 PRINT "ENTER A STRING OF
   5 DIGITS : ";A$
20     IF LEN(A$)<>5 THEN 10
30   FOR I=1 TO LEN(A$)
40     S=ASC(MID$(A$,I,1))-48
50     IF S<0 OR S>9 THEN 10
60      A(I)=S : C(I)=S
70      IF S=0 THEN C(I)=C(I)+10
80   NEXT I
90 PRINT : PRINT A$: PRINT "-----"
100 ´ ****************************
```

APPLE • ALTOS • ATARI • MAXELL • DYSAN • EPSON • CCS • SHARP • CASIO • HP • VERBATIM • MEMOREX • SOROC • CORVUS • ADDS

MICRO

BUSINESS WORLD INC.
Information Line (213) 996-2252
TOLL FREE MAIL ORDER LINES
(800) 423-5886 Outside Calif.

SPECIAL OF THE MONTH

HEWLETT PACKARD
HP83
LIMITED QUANTITY
MSL 2250.00
$795.00
Save 1455.00

Put a Genie In Your Computer Intelligent Printer Interface Card
Works With
- Integer Basic
- Applesoft*
- Pascal 1.0 & 1.1
- CP/M**

OUR PRICE $119.00
MSL 159.00
Save 40.00

*Applesoft is a registered Trademark of Apple Computer, Inc.
**CP/M is a registered trademark of Digital Research.

MICRO-SCI
APPLE II+ COMPATIBLE DRIVE

W/ CONTROLLER		W/O CONTROLLER	
MSL 549.00	OUR PRICE 429.00	MSL 449.00	OUR PRICE 379.00
Save 216.00	COMPARE TO APPLE DRIVE	*Save* 146.00	COMPARE TO APPLE DRIVE

APPLE IS A REG. TRADE MARK OF APPLE COMPUTER

IBM PERSONAL COMPUTER
INCLUDES:
2 Drives
Colour Graphic Board
64K Memory

CALL FOR PRICE
*Subject to availability

SMITH CORONA TPI DAISY WHEEL PRINTER
Letter Quality
OUR PRICE $599.00
MSL 895.00
Save 296.00

CASIO FX9000P PERSONAL COMPUTER
POWERFUL CA-BASIC
NEW
AND C/MOS-RAM
MSL 995.00
OUR PRICE $599.00
Save 396.00

LE MONITOR
METAL CABINET
9" GRN. PHS. MONITOR
12" GRN. PHS. MONITOR
1 Yr. Warranty
MSL 189.00
OUR PRICE $119.00
Save 70.00

APPLE II PLUS 48K
*Subject to availability
CALL FOR PRICE
APPLE IS A REG. TRADEMARK OF APPLE COMPUTER

FRANKLIN BUSINESS SYSTEM
Franklin Ace 100 system • 64K • Disk Drive with controller card • 12" green phs. video monitor.

$1695.00
SAVE $1000 COMPARED TO APPLE SYSTEM

VIC 20 EXPANSION
OUR PRICE 189.00
MSL 229.00
Save 40.00

FEATURES:
• 7 expansion slots • All aluminum construction • Large power supply with torodial transformer • 5 volt supply direct ot the VIC 20 for cooler operation • 24 volt supply for the Arfon Micro VIC Printer • Detachable cover protects cartridges • Houses VIC and Expansion in one portable unit • Holder for RF modulator • Supports all VIC 20 cartridges from Arfon Micro, Commodore and others

AXIOM DOT MATRIX GP 100
8½" wide paper
MSL 389.00
OUR PRICE $269.00
Save 120.00

HP 125
OUR PRICE $1975.00
MSL 2750.00
Save 775.00

DUAL MASTER DRIVE
MSL 2500.00
OUR PRICE 1595.00
Save 905.00

XEROX 820
WORD PROCESSING SYSTEM (INCLUDES SOFTWARE)
MSL 3495.00
OUR PRICE $2649.00
Save 846.00

NEC STUDENT SYSTEM 64K
*NEC PC 80001
*NEC PC 8012
*NEC PC 8031
12" Grn. Phs. Video Monitor
MSL 2839.00
OUR PRICE $2095.00
Save 744.00

HEWLETT PACKARD HP-87
MSL 2495.00
OUR PRICE $1749.00
Save 746.00

commodore VIC-20
Vic-TV Modual $19.00
Vic Cassette $69.00
Vic Disk Drive .... $ Call
Vic 6 Pack program $44.00

MSL 299.00
OUR PRICE 235.00
Save 64.00

EPSON
INCLUDES GRAFTRAX

	MSL	OUR PRICE	*Save*
MX 80	645.00	429.00	216.00
MX 80FT	745.00	535.00	210.00
MX 100	995.00	669.00	326.00

commodore STUDENT SYSTEM
4032 - 32K 40 COL CRT
4940 - DUAL DISK DRIVE
MSL 2590.00
OUR PRICE $1978.00
Save 612.00

WE RESERVE THE RIGHT TO CORRECT TYPOGRAPHICAL ERRORS. THIS AD SUPERCEDES ALL PREVIOUS ADS.

RADIO SHACK 48K
TRS 80 W/2 DRIVE MOD III
MSL 2495.00
OUR PRICE $1799.00
Save 696.00

1 Year Extended WARRANTY
$99.00
INQUIRE

$
AVINGS
ERVICE
ELECTION
ATISFACTION

MICRO MAIL ORDER
BUSINESS WORLD WAREHOUSE
18720 Oxnard, #108
Tarzana, CA 91356
OUTSIDE CA CALL TOLL FREE 1 (800) 423-5886 IN CA (213) 996-2252

Telex: 182852
Answer: MICKO TZNA

*California residents add 6% sales tax.
**Add 3% Shipping & Handling — Add 3% surcharge for credit cards. Orders cannot be shipped unless accompanied by payment, including shipping, handling and tax where applicable.

Name (Please print) ______
Address ______
City ______ State ______ Zip ______

Qty	Make	Model	Description	Price	Total

TOTAL ORDER $ ______
TAX IF APPLICABLE* ______
SHIPPING & HANDLING** ______
TOTAL ENCLOSED $ ______

☐ Certified Check or M.O.
☐ Bank Wire Transfer
☐ Allow 2 weeks clearance for personal check

VISA
MasterCard

CREDIT CARD # ______
Exp. Date ______ Signature ______

MAXELL • DYSAN • EPSON • CCS • SHARP • CASIO • HP • VERBATIM • MEMOREX • SOROC • CORVUS • PERSONAL SOFTWARE • CCS

BMC • CENTRONIC • NEC • HAZELTINE • AMPEX • VERBATIM • HITACHI • HAYDEN • CANON • NOVATION • D.C. HAYS MICROCOMPUTERS • PAPER TIGER • PERSONAL SOFTWARE • GTE •

HP • D.C. HAYS MICROCOMPUTERS • PAPER TIGER • GTE • DIABLO • BMC • CENTRONIC • NEC • HAZELTINE • MEMOREX • AMPEX • PERSONAL SOFTWARE • ADDS • XEROX • DIABLO

CIRCLE 204 ON READER SERVICE CARD

Accounting Plus II™

Plus...

Software Dimensions announces three new modules for Apple II* users with Accounting Plus II — each designed with the same high standards and human engineering factors that have made Accounting Plus II so popular.

With **Invoices Plus** you can inventory items just by entering part numbers; easily invoice non-standard items and miscellaneous charges; place user-defined comment lines on the invoice; get twice as many line items per invoice; automatically generate multiple pages; specify individual invoice numbers or assign them automatically — and more.

G L Plus expands your financial reporting capabilities, including changes in your financial position, offering even more flexibility for your General Ledger module. Typical reporting features include Budget/Prior Months' Listing, Income Statements, Balance Sheets, Budget Variance Report, Comparative Reports, Source and Use of Funds.

Labels Plus offers a versatile label package that lets you maintain one or more mailing lists with up to 1,000 names each, as well as to access existing Vendor and Customer files easily; add, edit and delete names; sort and select; print mailing labels.

You won't find this kind of flexibility and sophistication in any other Apple II accounting system. To find out more, contact your Accounting Plus II dealer.

Software Dimensions Inc., 6341 Auburn Blvd., Citrus Heights, CA 95610. 916/722/8000

*Registered trademark of Apple Computer Inc. Accounting Plus is a trademark of Software Dimensions Inc.

© 1982 Software Dimensions Inc.

CIRCLE 308 ON READER SERVICE CARD

```
110 FOR L=1 TO 31
120   I=1
130   IF B(I) -1 THEN B(I)=0 : I=I+1 : GOTO 130
140    B(I)=1
145     S=0
150     FOR J=1 TO 5
160       S=S+C(J)*B(J)
170     NEXT J
180   IF S<>15 THEN 300
200   FOR J=1 TO 5
210     IF B(J)=0 THEN PRINT " "; :GOTO 230
220    PRINT A(J);
230   NEXT J
235 PRINT
240     T=T+1
300  NEXT L
310 PRINT:PRINT "THERE ARE ";T;"
    COMBINATIONS TOTALING 15."
320 END

ENTER A STRING OF 5 DIGITS : 50154

50154
-----
50
 0 5
 01 4
5 154

THERE ARE 4 COMBINATIONS TOTALING 15.

ENTER A STRING OF 5 DIGITS : 78787

78787
-----
78
 87
7  8
  78
 8  7
   87

THERE ARE 6 COMBINATIONS TOTALING 15.

ENTER A STRING OF 5 DIGITS : 55555

55555
-----
555
55 5
5 55
 555
55  5
5 5 5
 55 5
5  55
 5 55
  555

THERE ARE 10 COMBINATIONS TOTALING 15.

ENTER A STRING OF 5 DIGITS : 06528

06528
-----
0 5
  528

THERE ARE 2 COMBINATIONS TOTALING 15.

1 '     Senior Problem #3
2 '     AUTOMATED INFLATION
3 '     ********************
10 INPUT "% INCREASE = ";C
20 READ A$
30  IF A$="*END*" THEN END
40  A$=A$+" "
60    FOR I=1 TO LEN(A$)
70      IF MID$(A$,I,1)<>"$" THEN 250
100 X=I+1
110 P=0 : F=0
120 P=P+1
130  IF X+P=LEN(A$) THEN 180
140   IF MID$(A$,X+P,1)="." THEN F=F+1 : IF
      ASC(MID$(A$,X+P+1,1))<48 OR
      ASC(MID$(A$,X+P+1))>57 THEN 180
150  IF F=2 THEN 250
160   IF MID$(A$,X+P,1)<>" " THEN 120
170 '*********************************,
180   P$=MID$(A$,X,P)
190     W=VAL(P$)
200     W=W*(1+C/100)
210     W=INT(100*W +.5)/100
220 ' ********************************
230  Q$= STR$(W): B$=LEFT$(A$,X-1)+Q$+
                 RIGHT$(A$,LEN(A$)-P-X+1)
240 A$=B$
250 NEXT I
260 GOTO 20
280 '********************************
290 DATA "BE ADVISED THAT ITEM #1234 COST $12.95 OR
    2 FOR $25.00."
300 DATA "REMIT TO P.O. BOX 2000.
    MINIMUM ORDER IS $100."
310 DATA "*END*"

% INCREASE = 12
BE ADVISED THAT ITEM #1234 COST $14.5 OR 2 FOR $28.
REMIT TO P.O. BOX 2000. MINIMUM ORDER IS $112.

% INCREASE = 14
BE ADVISED THAT ITEM #1234 COST
$14.76 OR 2 FOR $28.50.
REMIT TO P.O. BOX 2000. MINIMUM ORDER IS $114.

1 '    Senior Problem #4
2 '    TENNIS SET
3 '    *****************
10 INPUT "NUMBER OF SETS = ";N
20 INPUT "% CHANCE 'A' WINS A POINT ";P
30 PRINT
40   FOR I=1 TO N
50     A=0 : B=0
60     X=RND(1)
70      IF X<P/100 THEN A=A+1 : GOTO 100
80      B=B+1: GOTO 120
100       IF A>=2 AND A>=B+2 THEN PRINT
          "A";:TA=TA+1:GOTO 150
110         GOTO 60
120       IF B>=2 AND B>=A+2 THEN PRINT
          "B";:TB=TB+1:GOTO 150
130         GOTO 60
150 '  ***************************+
160 IF TA>=6 AND TA>=TB+2 THEN PRINT "
    (A)":GA=GA+1: GOTO 200
170 IF TB>=6 AND TB>=TA+2 THEN PRINT "
    (B)": GOTO 200
180   GOTO 50
200     TA=0:TB=0
210  NEXT I

220 '*******************************+
230  PRINT
240   PRINT "PLAYER 'A' WON";GA;"SETS OUT OF ";N
250 END

NUMBER OF SETS =  10
% CHANCE 'A' WINS A POINT =  55

AAABBABBAA (A)
AABAAAA (A)
BBAAABAAA (A)
AAAAAA (A)
AABBAABBBAABABAA (A)
BABAAABABA (A)
AABBAAABA (A)
BAAAAABBBA (A)
AAAAABA (A)
AAABAABBBA (A)

PLAYER 'A' WON 10 SETS OUT OF  10
```

From Aspen Software
The Only Complete Document Proofreading System
For CP/M*, TRS-80* and IBM-PC Word Processors

PROOFREADER T.M.

Featuring Random House® Dictionary

- Complete Accuracy-looks up every word; does not use less accurate root word analysis, plus Random House Dictionary
- Full Interactive Correction-standard
- Instant Access to Dictionary
- Compact-Random House Dictionary supplied in sizes to fit your system (50,000 words standard)

+

GRAMMATIK T.M.

Beyond Spelling Checking

- Detects typos, punctuation and capitalization errors, misused words and phrases
- Analyzes Writing Style
- Suggests Alternative Usages

= NO ERRORS

"The programs together (Proofreader and Grammatik) offer a dynamic tool for comprehensive editing beyond spelling corrections."
--Dona Z. Meilach in Interface Age, 5 82

"Grammatik is the perfect complement to a spelling check program."
--Dr. Alan R. Miller in Interface Age, 5 82

"If you use a word processor and a spelling checker, then you should investigate the unique capabilities of this program. Grammatik is a surprisingly fast and easy to use tool for analyzing writing style and punctuation."
--Bob Louden in InfoWorld, 12 81

"For the user who is as tight with his dollar as I, Proofreader is the program of choice."
–Stephen Kimmel in Creative Computing, 3 82

"Anyone involved with word processing in any way, whether writing manuals, letters, brochures, newscopy, reports, etc. is encouraged to get the excellent program Grammatik."
--A.A. Wicks in Computronics, 6 82

Grammatik and Proofreader are compatible with all CP/M, MS-DOS (incl. IBM-PC), and TRS-80 word processors. Current CP/M formats: standard 8", Northstar, Omikron, Osborne, Apple. Please call/or write for details of minimum system sizes and availability of additional disk and operating system formats. Shipping costs included. Please specify your system configuration when ordering. Dealers inquiries invited.

	Proofreader	Grammatik	Both
CP/M, MS-DOS	$129.00	$150.00	$250.00
TRS-80 Model II	n/a	$99.00	
TRS-80 Mod. I/III	$89.00	$59.00	$139.00

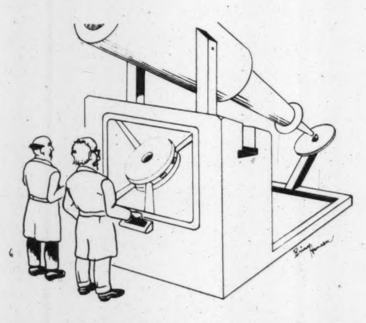
Random House is a registered trademark of Random House, Inc. Other registered trademarks: CP/M: Digital Research; TRS-80: Tandy Corp.; MS-DOS: Microsoft; IBM: IBM; Proofreader, Grammatik: Aspen Software Co.

Aspen Software Co.
P.O. Box 339-C Tijeras, NM 87059
(505) 281-1634

How to Solve It, continued...

```
1 '    Senior Problem #5
2 '    FRACTIONS TO DECIMALS
3 '    *********************



10 INPUT "ENTER YOUR FRACTION : ";A$:PRINT
15 DIM Q(99),RM(99)
20   ' R=REMAINDER, D=DENOMINATOR, Q= DIGITS OF ANSWER
30    R=VAL (A$): Z=LEN(STR$(R))+2 : D=VAL(MID$(A$,Z))
40 PRINT A$; " = ";
50       IF R<D THEN 70
60       A=INT(R/D):PRINT A;:R=R-A*D
70        R=R*10
80  FOR L=0 TO 99
90     IF R=0 THEN L=L-1 : GOTO 130
100     RM(L)=R: Q(L)=INT(R/D): R=10*(R-Q(L)*D)
110       FOR L2=0 TO L: IF R=RM(L2) THEN FL =1 :GOTO 130
120       NEXT L2 : NEXT L : PRINT "NO REPETITIONS IN FIRST 100 DIGITS."
130 ' ****************************



140 IF L=-1 THEN 180
150 PRINT ".";
160   FOR Z=0 TO L: IF FL AND L2=Z THEN PRINT "(";
170     PRINT Q(Z);: NEXT : IF FL THEN PRINT ")";
180 PRINT :PRINT :END
```

```
ENTER YOUR FRACTION : 1/3

1/3 = .(3)


ENTER YOUR FRACTION : 22/5

22/5 = 4.4


ENTER YOUR FRACTION : 1/7

1/7 = .(142857)


ENTER YOUR FRACTION : 3/8

3/8 = .375


ENTER YOUR FRACTION : 45/56

45/56 = .803(571428)


ENTER YOUR FRACTION : 11/59

11/59 = .(1864406779661016949152542372881355932203389830508474576271)
```



"There it is, Perkins, the most elementary particle of matter."

INTERNATIONAL SUMMER CONSUMER ELECTRONICS SHOW

June 6-9, 1982

McCormick Place, McCormick Inn
Conrad Hilton Hotel, Chicago

1982 NATIONAL COMPUTER CONFERENCE

JUNE 7-10 • ASTRODOMAIN • HOUSTON, TEXAS

David H. Ahl

Manufacturers show off their wares at two extravaganzas

I was on the first flight in the morning of Tuesday, June 8 from Chicago to Houston. My seatmate, an engineer connected with the oil pipeline busiess, commented to me that after years of flying between Chicago and Houston, he had rarely seen a plane absolutely full.

I allowed that the full load was understandable since probably three quarters of the people on the flight were going from CES to NCC.

"CES. NCC. What are those?" he asked.

"Good question," said I and went on to explain about the two largest extravaganzas in the consumer electronics and computer industries.

CES is short for Consumer Electronics Show. It is held twice a year, the Winter CES the first week in January in Las Vegas, and the Summer CES the first week in June in Chicago. It is strictly an industry show; the general public is not allowed in. It's the place where manufacturers of hi-fi systems, video equipment, personal communications, security systems, telephones, video games, electronic games, wristwatches, calculators, and every other conceivable consumer electronic device come to display their wares.

The audience (show attendees) are principally buyers for department stores, chains, and independent dealers. Also other manufacturers attend to see what the competition is up to and, of course, the press is there en masse to see what's new and report on it for their respective audiences.

CES sprawls over three floors of the McCormick Place Exhibition Center as well as acres of pavement outside (for the satellite antenna systems and dishes) and spills over into two hotels. The booths are lavish and spectacular with many covering as much as 2000 square feet. Those on the main floor are often two-story affairs with private lounges on the second floor, well stocked with refreshments, for closing the big deals.

Every effort is made to woo the dealer, particularly in hotly competitive areas such as video game cartridges, component hi-fi systems, and auto sound systems. Activision, for example, sponsored an elaborate party with a jungle theme to introduce their new Atari video cartridges. Jensen sponsored a paddle wheel cruise on Lake Michigan to show off their new auto sound speakers. On any given evening of the show, at least twenty-five receptions are being held simultaneously.

Unlike a consumer show where the products displayed are all available, CES is a place for trial balloons. Frequently, manufacturers will show prototype products. If they get enough orders, the item goes into production. On the other hand, if demand is soft, the product may never see the light of day. For example, three years ago five video game systems were shown at CES but only one of them, the Atari VCS, ever made it to marketing a major way. At each succeeding CES, various Hong Kong and Japanese companies have shown programmable game units for private labelling. One, the Radofin was picked up by a discount store chain to sell under their brand name, but it never really got off the ground. This year, however, a resurgence of interest in video game units was evident with major manufacturers such as Coleco jumping into the fray. By Christmas, there will be six competing units on the market: the Atari VCS, the Atari 5200 (a 400 computer system without a keyboard), Mattel Intellivision, NAP, Odyssey 2, Colecovision, and systems from Emerson and Tyrom (the makers of the Omar backgammon and chess computers).

There were only three new computers at CES, the Panasonic JR-200, NEC PC

CES/NCC continued...

6000 and Sinclair Spectrum. Several Japanese manufacturers were showing computers that had been shown at previous CES shows but for which there was not sufficient demand to bring them to market. We are assured now, though, that Casio, Quasar, and Toshiba will all have new units on the market by year end.

Speaking of computers, why should the NCC (National Computer Conference) be scheduled the same week as CES? Simply because five years ago when these shows were scheduled no one forecast that computers would be a consumer item and that there would be any overlap in exhibitors or audience for the two shows. Today, we know better, but unfortunately, many manufacturers had to make a hard decision as to which show to exhibit in. Some, such as Commodore, Texas Instruments, Toshiba and Panasonic elected to exhibit in both shows. Others such as Atari, Casio and Sinclair put all their marbles in CES. But the vast majority of computer manufacturers opted for NCC.

Like CES, NCC is also an industry show; the general public is not allowed in. Although a huge show with high attendance (over 90,000), NCC is far more sedate than CES. Although manufacturers spend big bucks displaying their hardware to best advantage, they tend to do it without the aid of Penthouse Pets, Playboy Bunnies, and other scantily clad females gracing their booths. NCC is also somewhat quieter than CES since there aren't scores of hi-fi manufacturers vying with each other to show off zillion watt amplifiers or earth shaking woofers.

Inevitably at every press reception or meeting in the press room the first question asked is, "what did you see that's new?" That's what we are going to try to answer for you, albeit somewhat briefly, in the space below. We can't begin to describe all of the new products of the over 600 manufacturers represented at the two shows. However, we have tried to select some of the most significant new introductions, the most interesting, and some novel and unexpected entries.

Among my colleagues, there was general consensus that this was the year of the video game at CES. I counted 16 separate manufacturers making cartridges for the Atari VCS and six making other systems or cartridges. This growth is staggering from the three manufacturers that existed a year ago.

NCC was unquestionably dominated by microcomputers and more specifically, small business systems. There were at least four Osborne clones, two Apple clones and scores of TRS-80 Model III look-a-likes.

And now, join us for a tour of these shows and some of the new products displayed.

COMPUTERS

Epson Compact Computer

A notebook-sized computer that runs on internal batteries for up to 50 hours with power and features comparable to many desktop computers was introduced by Epson America.

Called the HX-20, the computer features 16K RAM expandable to 32K, and 32K ROM expandable to 64K with an optional expansion unit. Other features include RS-232C and serial interfaces, a full-size ASCII keyboard, a built-in 24-column dot matrix printer with bit addressable graphics capabilities, an LCD virtual screen with a 20 x 4 character display and virtual width to 255 characters available by Basic "width" command, and tone generation.

The HX-20 uses an extended version of Microsoft Basic and has internal time, date and alarm string functions. Optional interfaces include a barcode reader, audio cassette, and systems bus for expanded capabilities. A microcassette and ROM cartridge are also available.

Epson America, Inc., 3415 Kashiwa St., Torrance, CA 90505. (213) 539-9140.

CIRCLE 340 ON READER SERVICE CARD

Cromemco CP/M System

Cromemco, Inc., announced the C-10 personal computer system. It uses a Z-80A microprocessor operating at 4MHz with 64K of RAM, and has a 25 line by 80 character graphics display on a 12" green phosphor CRT.

The C-10 Super Pak system also includes a double sided, double density disk drive, a detachable keyboard, RS-232 serial and parallel ports, and an RS-232 modem port with full handshake capability and an array of software packages. The software packages include a CP/M compatible operating system, Structured Basic, as a word processing package and a spread-sheet calculator program. $785.

Cromemco also offers the pieces as separate items. The C-10 personal computer itself, is $995. The model CKBA keyboard is $195, the model CST ergonomic stand, $195; the 309 Kb model CFD floppy disk drive, $595; and the model CLQ letter-quality printer, $895.

The use of double sided, double density 5 1/4" floppy disk drives gives the C-10 drives 390 kilobytes of storage per drive The C-10 is also upwardly software compatible with other Cromemco computers, including the System One, System Two and System Three series. All programs that can run under the CP/M or CDOS operating systems can also be run under Cromix, Cromemco's proprietary version of Unix. If a piece of software is written in Cromemco's Structured Basic language, the program created on the C-10 can run on Cromemco's 16/32-bit Motorola 68000 microprocessor-based CPU board, the DPU. In addition to the Structured Basic included with the Super Pak and word processing packages, high-level languages such as Fortan, rational Fortran, and Cobol are available.

Cromemco, Inc., 280 Bernardo Ave., Mountain View, CA 94043. (415) 964-7400.

CIRCLE 341 ON READER SERVICE CARD

Wang Professional Computer

Wang Laboratories, Inc. introduced the Wang Professional Computer. It includes a 16-bit professional computing system, the ability to function as a workstation on any Wang 2200, Virtual Storage (VS), Office Information System (OIS), or Alliance system, and more communications options. The Wang Professional Computer can run in stand-alone mode, through coaxial cable to other Wang products, over phone lines to Wang and non-Wang products, and through Wang-Net, Wang's local area network.

Other features include Microsoft's Disk Operating System (MS-DOS), which is enhanced by Wang, and optional CP/M 80 operating system emulation, and Wang's PC-Word Processing.

The Wang Professional Computer is a highly modular system. It can be configured as the basic "off-the-shelf" system with the electronics enclosure and detachable keyboard, or it can be expanded into

California Accessory Warehouse

DISCOUNT COMPUTER ACCESSORIES

apple®

Apple is a Registered Trademark of Apple Computer, Inc.

NAME	*	PRICE
3D GRAPHICS by BUDGE	DK	$34
3D SUPERGRAPHICS	DK	34
ACCTS PAY. by CONT.	DK	213
ACCTS REC. by CONT.	DK	213
ADVENTURELAND	CS	17
ALIEN RAIN	DK	21
APPLE PANIC	DK	26
APPLE SPELLER	DK	64
ASTEROID by ON LINE	DK	17
ATLANTIS	DK	34
B-1 NUCLEAR BOMBER	CS	14
BEER RUN	DK	26
BORG	DK	26
BUG ATTACK	DK	26
BUDGE'S 3D GRAPHICS	DK	34
BUDGE'S TRILOGY	DK	26
BUDGET PLANNER	DK	128
CALCSTAR	DK	166
CA STATE TAX PREP.	DK	64
CASTLE WOLFENSTEIN	DK	26
CEILING ZERO	DK	26
COMPU-MATH/ARITH.	DK	43
COMPU-MATH/DECIMALS	DK	34
COMPU-MATH/FRACTIONS	DK	34
COMPU-READ	DK	26
COMPUTER FOOSBALL	DK	26
COMPUTER GOLF	DK	26

NAME	*	PRICE
COMP. STOCKS & BONDS	CS	$14
CONTEXT CONNECTOR	DK	153
COUNT	CS	17
CPA #1 GEN. LEDGER	DK	213
CPA #2 ACCTS REC.	DK	213
CPA #3 ACCTS PAY.	DK	213
CPA #4 PAYROLL	DK	213
CPA #5 PROP. MGMT.	DK	421
CRUSH,CRUMBLE & CHOMP	DK	26
CYBORG	DK	28
D.B. MASTER	DK	195
DATA CAPTURE 4.0	DK	55
DATA FACTORY	DK	128
DATA REPORTER	DK	128
DATASTAR	DK	251
DOS BOSS	DK	21
DUNG BEETLE	DK	26
E-Z LEDGER	DK	51
ELECTRIC DUET	DK	26
ELIMINATOR	DK	21
EXECUTIVE SECRETARY	DK	213
FLIGHT SIMULATOR	DK	29
FORTE	DK	26
FROGER	DK	30
GAME PADDLES	AC	34
GEN. LEDGER by CONT.	DK	213
GHOST TOWN	CS	17
GOLDEN VOYAGE	CS	17
GRAFORTH II	DK	81
GRAPHIC PACKAGE	DK	51
GROGON	DK	34

NAME	*	PRICE
GUNS-FORT DEFIANCE	DK	$21
HELLFIRE WARRIOR	DK	34
HOME ACCOUNTANT	DK	64
HOME MONEY MINDER	DK	30
HORIZON V	DK	30
INVASION ORION	DK	21
JAWBREAKER	DK	26
JOYSTICK	AC	51
KEYBOARD ENHANCER	AC	110
MAGIC WINDOW	DK	85
MAGIC WORDS	DK	60
MAILMERGE	DK	106
MASTER TYPE	DK	34
MATHMAGIC	DK	77
MICRO MEMO	DK	34
MICROWAVE	DK	30
MISSION IMPOSSIBLE	CS	17
MOUSEATTACK	DK	30
MYSTERY FUN HOUSE	CS	17
NEUTRONS	DK	26
OLYMPIC DECATHLON	DK	26
OUTPOST	DK	26
PAYROLL—BRODERBUND	DK	213
PAYROLL—CONTINENTAL	DK	336
PFS: REPORT	DK	81
PFS: PERS. FILING SYS	DK	106
PLANETOIDS ASTEROIDS	DK	21
POOL 1.5	DK	30
PIRATE'S ADVENTURE	CS	17
PROF. EASYMAILER	DK	128
PROF. EASYWRITER	DK	213
PROPERTY MGMT.—CONT.	DK	421
PYRAMID OF DOOM	CS	17
RASTER BLASTER	DK	26
RICOCHET	DK	17
RUBIK CUBE UNLOCKED	DK	21

NAME	*	PRICE
RUSSKI DUCK	DK	$30
SARGON II	DK	30
SAVAGE ISLAND	CS	17
SNACK ATTACK	DK	26
SNAKE BYTE	DK	26
SNEAKERS	DK	26
SORCERER OF SIVA	DK	26
SPACE QUARKS	DK	26
SPELLSTAR	DK	170
STAR BLASTER	DK	26
STAR THIEF	DK	26
STRANGE ODYSSEY	CS	17
SUPERSCRIBE II	DK	111
SUPERSOFT I	DK	170
SWASHBUCKLER	DK	30
SWITCHPLATE	AC	16
TASC COMPLIER	DK	149
TAX MANAGER	DK	128
TEMPLE OF APSHAI	DK	34
THRESHOLD	DK	34
TIME ZONE by ON LINE	DK	85
TRILOGY GAME by BUDGE	DK	26
TWERPS	DK	26
ULTIMA	DK	34
ULYS & GOLDEN FLEECE	DK	30
UTILITY CITY	DK	25
VISICALC 3.3	DK	213
VISIFILE	DK	213
VISISCHEDULE	DK	255
VISITREND/VISIPLOT	DK	255
VOODOO CASTLE	CS	17
WIZARDRY	DK	43
WORDSTAR	DK	319
WORDSTAR GUIDE	BK	17
ZERO GRAVITY PINBALL	DK	26
ZORK	DK	34

ATARI®

Atari is a Registered Trademark of Atari Inc.

NAME	*	PRICE
3-D SUPERGRAPHICS	DK	$34
ADVENTURELAND	CS	17
ALI BABA & 40 THIEVES	DK	28
ANDROMEDA	DK	34
APPLE PANIC	DK	26
ASTEROIDS BY ATARI	CT	38
B-1 NUCLEAR BOMBER	CS	14
BUG ATTACK	DK	26
CAVERNS OF MARS	DK	34
CENTIPEDE BY ATARI	CT	38
COMP. STOCKS & BONDS	DK	18
CROSSFIRE	DK	26

NAME	*	PRICE
CRUSH,CRUMBLE & CHOMP	DK	$26
CYPHER BOWL	CS	43
DUNG BEETLE	DK	26
FROGGER	DK	30
GALACTIC CHASE	DK	26
GHOST HUNTER	CS	26
GHOST TOWN	CS	17
GOLDEN VOYAGE	CS	17
GRAPHIC COMPOSER	CS	34
JAWBREAKER	DK	26
JOYSTICKS (pair)	AC	19
K-RAZY SHOOTOUT	CT	43

NAME	*	PRICE
LE STICK	AC	$34
LUNAR LANDER	CS	13
MATCH RACERS	DK	26
MISSION IMPOSSIBLE	CS	17
MISSION: ASTEROID	DK	21
MOUSEATTACK	DK	30
MYSTERY FUN HOUSE	CS	17
PAC MAN—BY ATARI	CT	38
PADDLES by ATARI	AC	19
PIRATE'S ADVENTURE	CS	17
POOL 1.5	DK	30
PYRAMID OF DOOM	CS	17

NAME	*	PRICE
RASTER BLASTER	DK	$26
RICOCHET	DK	17
SAVAGE ISLAND	CS	17
SPACE INVADERS	CT	38
STRANGE ODYSSEY	CS	17
TEMPLE OF APSHAI	DK	34
THE COUNT	CS	17
THRESHOLD	DK	34
VERSA. GRAPHIC TABLETS	AC	254
VISICALC	DK	213
VOODOO CASTLE	CS	17
WIZ & PRINCESS	DK	28

Radio Shack® TRS-80®

TRS-80 is a Registered Trademark of the Radio Shack Division of Tandy Corporation

NAME	*	PRICE
ADVENTURELAND	CS	$17
B-1 NUCLEAR BOMBER	CS	14
BASIC COMPILER	DK	166
COMP. STOCKS & BONDS	DK	18
CRUSH,CRUMBLE & CHOMP	DK	26
DEFENSE COMMAND	DK	17
DUEL-N-DROIDS	DK	18
ELIMINATOR	DK	17
FLIGHT SIMULATOR	CS	21
GHOST TOWN	CS	17
GOLDEN VOYAGE	CS	17
GUNS—FORT DEFIANCE	DK	21
INVASION ORION	DK	21
MATHEMAGIC	DK	77
METEOR MISSION II	CS	14
MIDWAY CAMPAIGN	CS	14
MISSION IMPOSSIBLE	CS	17

NAME	*	PRICE
MYSTERY FUN HOUSE	CS	$17
OLYMPIC DECATHLON	DK	26
PIGSKIN	DK	17
PIRATE'S ADVENTURE	CS	17
PLANETOIDS-ASTEROIDS	DK	17
PYRAMID OF DOOM	CS	17
RICOCHET	DK	17
SARGON II	DK	26
SAVAGE ISLAND	CS	17
SCARFMAN	DK	14
SPACE INTRUDERS	DK	17
STAR WARRIOR	DK	34
STRANGE ODYSSEY	CS	17
TANKTICS	CS	21
TEMPLE OF APSHAI	DK	34
THE COUNT	CS	17
VOODOO CASTLE	CS	17

- **CALL FOR NEW & OTHER AVAILABLE UNLISTED ITEMS**
- **Manufacturer Originals not copies**
- **No extra cost for credit card orders**
- **Fast shipping to your door**

* TYPE KEY:

AC	ACCESSORY	BK	BOOK
CS	CASSETTE		
CT	CARTRIDGE		
DK	DISK		

Free Shipping!

When ordering state make and model of machine and choice of disk or cassette. Free shipping only within the Continental U.S. Freight is extra for foreign APO, FPO, Alaska and Hawaii. Check or money order

No sales tax! (except in California residents, add 6%)

VISA MasterCard

call 1-213-781-3828

California Accessory Warehouse
13273 Glenoaks Blvd.
Sylmar, CA 91342

CIRCLE 126 ON READER SERVICE CARD

more powerful configurations with optional displays or home TV connection, printers, and diskette or Winchester disk storage devices.

The Base System Unit, Model PC001, contains the electronic enclosure with 128K memory, a 320K disk drive low-profile keyboard, MS-DOS operating system, and Basic interpreter.

Four Standard configurations are available. The Wang Professional Computer Base System Unit (Model PC001) costs $2695. Other units are priced to $8945.

Wang Laboratories, Inc., One Industrial Ave., Lowell, MA 01851. (617) 459-5000.

CIRCLE 342 ON READER SERVICE CARD

Innovative Unit from Grid

Grid Systems Corporation announced the portable Compass Computer which provides managers of corporations with the means of gathering information from colleagues and internal and external databases, the tools to analyze this information, and a way to report their results. It includes program development tools and applications programs that include text editing, graphics, a project management package, database management and an electronic spread sheet program, terminal emulators, and a network of supcomputers that extend the Compass Computer's range and power.

The compact 9 1/4 lb. Compass Computer is a portable workstation for a corporate management information system, and both Grid Central and Compass Central are support computers backing up Compass Computer users.

A bit-mapped, flat-panel display measuring 4 3/4" x 3 1/2" can produce characters along with charts or graphs. A matrix density of 320 by 240 dots produces high-quality graphic images in amber which, according to recent studies, produces the least eye strain. For text-editing application, the screen can display as many as 24 lines and up to 70 proportionally spaced characters.

Wider data formats can be viewed by scrolling, which extends the width of the text to as many as 256 characters. When handling columnar data, as many as 256 columns of varying widths can be created. In this way, the left-to-right width for columnar documents such as spread sheets is virtually limitless on the Compass Computer. Base price $8150.

Among the developmental tools included in the Compass Computer are five compatible languages (Microsoft-compatible Basic, Pascal, C, PL/M, and Fortran 77), an editor, and a macro assembler. The five applications packages are Gridfile, Gridplan, Gridplot, Gridwriter, and Gridpath.

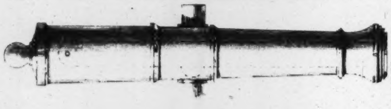
Grid Systems Corporation, 2535 Garcia Ave., Mountain View, CA 94043. (415) 961-4800.

CIRCLE 343 ON READER SERVICE CARD

Micro Source Portable Unit

Micro Source Inc. introduced the M6000P portable microcomputer system. The standard system features the Z-80 CPU, 64K RAM, a standard keyboard with 83 keys, a 9" CRT with 80 character by 24 line video interface, and a CP/M 2.2 operating system. The system includes two double sided, double density, 5 1/4" disk drives. An 8-slot card cage can hold a wide variety of STD Bus circuit boards.

Micro Source Inc., 595 N. Clayton Rd., New Lebanon, OH 45345. (513) 687-1395.



Apple III CP/M Card

Apple Computer announced Softcard III, an Apple III Z80 board for CP/M capability. With the Apple Softcard III System, CP/M-based application programs join the Apple III library of software, which is based on the Apple III Sophisticated Operating System (SOS). The system supports the Apple 5-megabyte mass storage system, Profile, on which both SOS and CP/M files can be stored.

The Apple Softcard III System includes a plug-in Z80 microprocessor card, CP/M software, four manuals, and Microsoft Basic. The system requires a 128K Apple III personal computer with a suitable video display device. Optional peripheral devices include a compatible printer, external Apple Disk III drives or Profile hard-disk drive. $450.

Apple Computer, Inc., 10260 Bandley Dr., Cupertino, CA 95014. (408) 996-1010.

CIRCLE 344 ON READER SERVICE CARD

Dynabyte Monarch

The Dynabyte Monarch is a multiuser computer system for concurrent processing of both 8 and 16-bit programs.

Monarch supports CP/M, MP/M II, CP/M-86, MP/M-86, Unix, Oasis-16 and Business Basic (Basic Four compatible). Monarch incorporates a single-board design without giving up expansion capabilities. Both the Multibus and S-100 bus are offered as optional internal card cages.

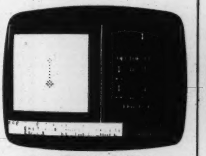
Monarch's Model 6600 standard configuration includes 256K RAM, 19Mb Winchester disk storage, nine RS-232 serial ports, one RS-422 high speed port, one parallel port, and an 8" IBM-compatible disk drive. $10,995. Eight additional serial ports can be added, as well as up to 1 megabyte of memory in 256K increments. Monarch can expand to 76Mb and a 17Mb cartridge tape drive expansion unit. Error correction circuitry is also available.

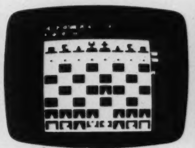
Dynabyte, 521 Cottonwood Dr., Milpitas, CA 95035. (408) 263-1221.

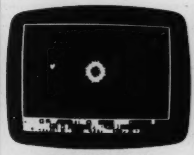
CIRCLE 345 ON READER SERVICE CARD

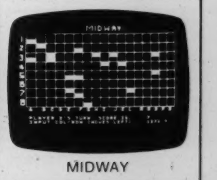
It's hard to picture all of DYNACOMP's *software*

GIN RUMMY

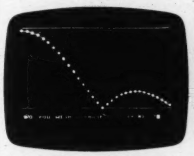

SHAPE MAGICIAN


CHESSMASTER


BLACK HOLE



MIDWAY


FOURIER ANALYZER

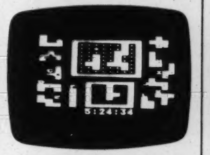
RINGS OF THE EMPIRE

LEM LANDER

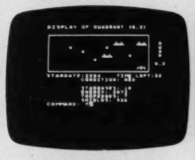
AMERICAN HOSPITAL SUPPLY
STOCKAID

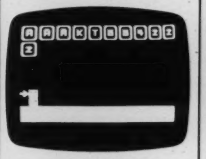
KIKI'S KOALA WALLY
HODGE PODGE

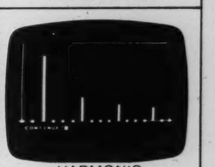
FIRE SCANNER
FOREST FIRE

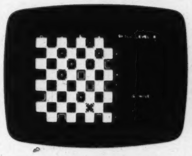


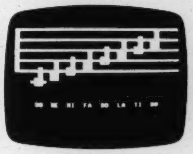
QUINTOMINOES


DISPLAY OF QUADRANT
STARBASE 3.2

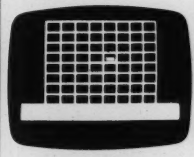

GO FISH

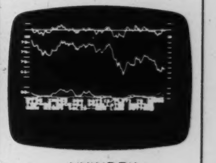

HARMONIC ANALYZER


CHECKERS 3.0

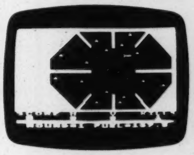

DO RE MI FA SO LA TI DO
HODGE PODGE

TRIPLE BLOCKARD


CHOMPELO

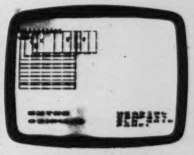

NYINDEX

609
× 422
1218
1218
2436
256998
TEACHER'S AIDE


SPACE TRAP

STOCK MASTER STOCK PLOT

BACCARAT


SUPER SUB CHASE

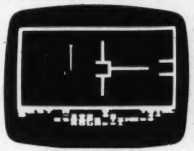
MAIL MASTER

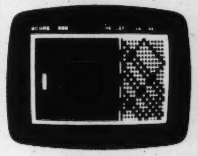
VALDEZ (MAP)

STOCK MASTER STOCK PLOT

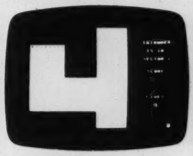
GIN RUMMY

TRADE ROUTE MAP
ABCDEFGHIJKLMNOPQR
SPACE LANES

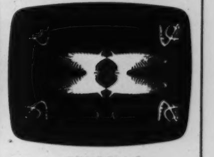

ESCAPE FROM VOLANTIUM



BREAKUP


INTRUDER ALERT

DYNACOMP P.F.S.
DISK DIRECTORY
PERSONAL FINANCE SYSTEM


CRYSTALS

TURN TO NEXT PAGE....

(c) 1982 PROMEDIA ASSOCIATES

DYNACOMP

Quality software for:*

APPLE II Plus
OSBORNE-1
NORTH STAR***
ATARI
PET/CBM
ALTAIR****
NEC PC-8000
TRS-80 (Level II)**
SUPERBRAIN*****
CP/M Disks/Diskettes
(See Availability box MBASIC/CBASIC)

CARD GAMES

NEW

BRIDGE MASTER (Available for all computers) Price: $21.95 Diskette
If you liked DYNACOMP'S BRIDGE 2.0, you will absolutely love BRIDGE MASTER. BRIDGE MASTER is a comprehensive bridge program designed to provide hours of challenging competition. Bidding features include the Blackwood convention, Stayman convention, pre-emptive openings, and recognition of demand bids and jump-shift responses. After playing a specific hand, you may replay the same hand, with the option of switching cards with your computer opponents. This feature allows you to compare your bidding and playing skills to BRIDGE MASTER. Bonuses for game contracts and slams are awarded as in duplicate bridge. Doubled contracts are scored based upon a computer assigned vulnerability. A score card is displayed at the conclusion of each hand. The score card displays a summary of total hands played, total points scored, number of contracts made and set, and % bids made. BRIDGE MASTER is clearly the best computer bridge program available.
DYNACOMP'S previous BRIDGE 2.0 customers may upgrade to BRIDGEMASTER for a nominal charge of $5.00 plus postage and handling (see ordering information box). Original cassette/diskette must be returned.

BACCARAT (Atari only) Price: $18.95 Cassette/$22.95 Diskette
This is the European card game which is the favorite of the Monte Carlo jet set. Imagine yourself at the gaming table with 007 to your left and Goldfinger to your right. Learn and play BACCARAT at your leisure on the Atari. Contains full high resolution color graphics and matching sound. Runs in 16K. Requires one joystick.

GIN RUMMY (Apple diskette only) Price: $22.95 Diskette
This is the best micro computer implementation of GIN RUMMY existing. The computer plays exceptionally well, and the HIRES graphics are superb. What else can be said?

POKER PARTY (Available for all computers) Price: $19.95 Cassette/$23.95 Diskette
POKER PARTY is a draw poker simulation based on the book, POKER, by Oswald Jacoby. This is the most comprehensive version available for microcomputers. The party consists of yourself and six other (computer) players. Each of these players (you will get to know them) has a different personality in the form of a varying propensity to bluff or fold under pressure. Practice with POKER PARTY before going to that expensive game tonight! Apple cassette and diskette versions require a 32K (or larger) Apple II.

GO FISH (Available for all computers) Price: $14.95 Cassette/$18.95 Diskette
GO FISH is a classic children's card game. The opponent is a friendly computer with user inputs that are simple enough for small children to easily master. The Apple and Atari versions employ high resolution graphics for the display of hands. A must for children! Runs in 16K.

NEW

BLACKJACK COACH (32K TRS-80 only) Price: $29.95 Cassette/$33.95 Diskette
BLACKJACK COACH teaches and evaluates professional playing methods. This program will coach you using the Basic and the Complete Card Counting Methods. The BLACKJACK COACH can be used in automatic, unattended play to test the playing and betting strategies you select. Extensive summary reports pinpoint the strengths and weaknesses of various methods of play. All the standard player choices are included: Insurance, splitting pairs, double downs and surrender (optional). A line printer may be used to collect data. If you risk money at the tables, increase your skills with the BLACKJACK COACH!

THOUGHT PROVOKERS

MANAGEMENT SIMULATOR (Available for all computers) Price: $25.95 Cassette/$29.95 Diskette
This program is both an excellent teaching tool as well as a stimulating intellectual game. Based upon similar games played at graduate business schools, each player or team controls a company which manufacturers three products. Each player attempts to outperform his competitors by setting selling prices, production volumes, marketing and design expenditures etc. The most successful firm is the one with the highest stock price when the simulation ends.

FLIGHT SIMULATOR (Available for all computers) Price: $19.95/Cassette/$23.95 Diskette
A realistic and extensive mathematical simulation of take-off, flight and landing. The program utilizes aerodynamic equations and the characteristics of a real airfoil. You can practice instrument approaches and navigation using radials and compass headings. The more advanced flyer can also perform loops, half-rolls and similar aerobatic maneuvers. Although this program does not employ graphics, it is exciting and very addictive. See the software review in COMPUTRONICS. Runs in 16K Atari.

VALDEZ (Available for all computers) Price: $17.95 Cassette/$21.95 Diskette
VALDEZ is a computer simulation of supertanker navigation in the Prince William Sound/Valdez Narrows region of Alaska. Included in this simulation is a realistic and extensive 256 x 256 element map, portions of which may be viewed using the ship's alphanumeric radar display. The motion of the ship itself is accurately modelled mathematically. The simulation also contains a model for the tidal patterns in the region, as well as other traffic (outgoing tankers and drifting icebergs). Chart your course from the Gulf of Alaska to Valdez Harbor! See the software reviews in 80 Software Critique, Personal Computing and Creative Computing.

BACKGAMMON 2.0 (Available for all computers) Price: $19.95 Cassette/$23.95 Diskette
This program tests your backgammon skills and will also improve your game. A human can compete against a computer or against another human. The computer can even play against itself. Either the human or the computer can double or generate dice rolls. Board positions can be created or saved for replay. BACKGAMMON 2.0 plays in accordance with the official rules of backgammon and is sure to provide many fascinating sessions of backgammon play.

NEW

FROG MASTER (Atari only) Price: $17.95 Cassette/$21.95 Diskette
The Atari APEX first prize winner. FROG MASTER contains exciting arcade features in addition to being a highly educational program. It is a fast-moving high-concentration game for 1-4 players. You score by making touchdowns on the opponents' goal line – if his goalie doesn't get there first. But your players (tadpoles and frogs) must be trained. This is accomplished by giving them a reward at just the right moment when they do something right. This takes precise timing and judgement. Your critters must penetrate barriers and avoid evil line backs if they are to score. Many will fall by the wayside, but some will get through. As they learn you can look inside their heads to see how they think. As you reward them, they reward you (the "thought processes" simulated demonstrate the basic type of animal learning - operant conditioning - widely studied in high school and college courses). As you teach them they teach you how learning takes place! Great graphics! Runs in 16K. Requires two joysticks.

FOREST FIRE! (Atari only) Price: $14.95 Cassette/$18.95 Diskette
Using excellent graphics and sound effects, this simulation puts you in the middle of a forest fire. Your job is to direct operations to put out the fire while compensating for changes in wind, weather and terrain. Not protecting valuable structures can result in startling penalities. Life-like variables are provided to make FOREST FIRE! very suspenseful and challenging. No two games have the same setting and there are 3 levels of difficulty.

CRANSTON MANOR ADVENTURE (North Star, SuperBrain and CP/M only) Price: $19.95 Diskette
At last! A comprehensive Adventure game for North Star and CP/M systems. CRANSTON MANOR ADVENTURE takes you into mysterious CRANSTON MANOR where you attempt to gather fabulous treasures. Lurking in the manor are wild animals and robots who will not give up the treasures without a fight. The number of rooms is greater and the associated descriptions are much more elaborate than the current popular series of Adventure programs, making this game the top in its class. Play can be stopped at any time and the status stored on diskette.

SPACE EVACUATION! (Available for all computers) Price: $15.95 Cassette/$19.95 Diskette
Can you colonize the galaxy and evacuate the Earth before the sun explodes? Your computer becomes the ship's computer as you explore the universe to relocate millions of people. This simulation is particularly interesting as it combines many of the exciting elements of classic space games with the mystery challenge of ADVENTURE.

MONARCH (Atari only) Price: $14.95 Cassette/$18.95 Diskette
MONARCH is a fascinating economic simulation requiring you to survive an 8-year term as your nation's leader. You determine the amount of acreage devoted to industrial and agricultural use, how much food to distribute to the populace and how much should be spent on pollution control. You will find that all decisions involve a compromise and that it is not easy to make everyone happy. Runs in 16K Atari.

NEW

RUBIK'S CUBE SOLVER (Available for all computers) Price: $14.95 Cassette/$18.95 Diskette/$21.45 Disk
Solving the Rubik's cube puzzle is an exercise in algorithimic logic, and is a "natural" for computer calculation. The RUBIK'S CUBE SOLVER permits you to input the starting state of the 24 facing elements of the cube. It then solves the problem one step at a time, with each step shown as a unfolded view of the cube. Can you solve the cube in fewer steps. In any case, it sure beats disassembling the cube or peeling off and replacing the colors! Requires 16K.

AVAILABILITY

DYNACOMP software is supplied with complete documentation containing clear explanations and examples. Unless otherwise specified, all programs will run within 16K program memory space (ATARI requires 24K). Except where noted, programs are available on ATARI, PET, TRS-80 (Level II), NEC and Apple (Applesoft) cassette and diskette as well as North Star single density (double density compatible) diskette. Additionally, most programs can be obtained on standard (IBM 3740 single density/double density compatible format) 8" CP/M floppy disks for systems running under MBASIC or CBASIC (for example, Altos, Xerox 820, Heath/Zenith and many others). 5¼" CP/M diskettes are available for the North Star, SuperBrain and Osborne computer systems.

**ATARI, PET/CBM, NORTH STAR, CP/M, IBM, OSBORNE, SUPERBRAIN, NEC PC-8000 and XEROX are registered tradenames and/or trademarks.*

***Except where noted, all TRS-80 Model I software is available on cassette (only) for the TRS-80 Model III. Exceptions: VALDEZ, CRIBBAGE, GRAFIX, CHESSMASTER, TRS-80 diskettes are not supplied with either DOS or BASIC.*

****For most North Star disk-based systems.*

*****For Altair systems having Microsoft BASIC.*

******For SUBERBRAIN systems running under MBASIC or CBASIC (state which).*

DYNACOMP OFFERS THE FOLLOWING

- Widest variety
- Guaranteed quality
- Fastest delivery
- Friendly service
- Free catalog*
- Toll free order phone

*$2.00 U.S. funds for foreign mailing.

AND MORE...

STARBASE 3.2 (Available for all computers) Price: $13.95 Cassette/$17.95 Diskette
This is the classic space simulation, but with several new features. For example, the Croylins now shoot at the Invincible without warning while also attacking starbases in other quadrants. The Croylins also attack with both light and heavy cruisers and move when shot at! The situation is hectic when the Invincible is besieged by three heavy cruisers and a starbase S.O.S. is received! The Croylins get even! See the software reviews in A.N.A.L.O.G., 80 Software Critique and Game Merchandising.

LIL' MEN FROM MARS (Atari only) Price: $19.95 Cassette/$23.95 Diskette
Defend yourself! The little men from Mars are out to get you if you don't get them first. This is a hilarious high resolution animated graphics (arcade) game which exercises much of the Atari's power. Requires one joystick.

NEW

ALVIN (Atari only) Price: $17.95 Cassette/$21.95 Diskette
ALVIN is a great arcade game. You are commanding a highly maneuverable ship seeking to destroy several enemy cities. You are attempting to bomb these cities while at the same time trying to avoid their defensive fire (MISSILE COMMAND™ in reverse?). Also, your radar has been damaged so that you can only see downwards. This would normally not be much of a problem except that you also have to contend with high-flying enemy aircraft. As long as you are above these aircraft you have the advantage and are safe. However, high level bombing takes considerable skill. Therefore to achieve your goal the best strategy is to swoop down for a bombing run while the enemy craft is out of range, and quickly retreat to the skies. A fun game. Requires 16K.

ESCAPE FROM VOLANTIUM (Atari only) Price: $15.95 Cassette/$19.95 Diskette
Bring the action and excitement of an arcade into your home with ESCAPE FROM VOLANTIUM! To escape you must maneuver your space ship around obstacles and laser blast the guardian (without being eaten). If he is killed with a direct shot (not just a leg lopped off), a door opens to the outside. However, the door does not stay open indefinitely. If you fail to escape in time, the door closes and a new guardian appears. Sometimes you can smash through the door by repeatedly chipping away at it. Other times it is impervious. At the higher levels of play more obstacles and guardians appear, adding to the excitement. Uses high resolution graphics and sound. Runs in 16K.

ALPHA FIGHTER (Atari only) Price: $13.95 Cassette/$17.95 Diskette
Two excellent graphics and action programs in one! ALPHA FIGHTER requires you to destroy the alien starships passing through your sector of the galaxy. ALPHA BASE is in the path of an alien UFO invasion; let five UFO's get by and the game ends. Both games require the joystick and get progressively more difficult the higher you score! ALPHA FIGHTER will run on 16K systems.

THE RINGS OF THE EMPIRE (Atari only) Price: $14.95 Cassette/$18.95 Diskette
The empire has developed a new battle station protected by rotating rings of energy. Each time you blast through the rings and destroy the station, the empire develops a new station with more protective rings. This exciting game runs on 16K systems, employs extensive graphics and sound and can be played by one or two players.

INTRUDER ALERT (Atari only) Price: $15.95 Cassette/$19.95 Diskette
This is a fast paced graphics game which places you in the middle of the "Dreadstar" having just stolen its plans. The droids have been alerted and are directed to destroy you at all costs. You must find and enter your ship to escape with the plans. Five levels of difficulty are provided. INTRUDER ALERT requires a joystick and will run on 16K systems.

MIDWAY (Atari 32K only) Price: $14.95 Cassette/$18.95 Diskette
MIDWAY is an exciting extension of the game of Battleship. It mixes the challenges of strategy and chance. Your opponent can be another human or the computer. Color graphics and sound are both included. Runs in 16K.

NEW

GOLF PRO (Atari only) Price: $17.95 Cassette/$21.95 Diskette
Both realism and beautiful graphics are joined together in GOLF PRO to produce the best golf simulation available. To really appreciate this game, you should have a color TV so that you can see the green of the fairway, the blue of the water hazards, and the white sand of the traps. You tee off with a wood, use your wedge in the sand trap, and putt on the green just as would be done on the course. Show off the Atari to your friends with GOLF PRO. Requires 16K and one joystick.

GAMES PACK I (Available for all computers) Price: $14.95 Cassette/$18.95 Diskette
GAMES PACK I contains the classic computer games of BLACKJACK, LUNAR LANDER, CRAPS, HORSERACE, SWITCH and more. These games have been combined into one large program for ease in loading. They are individually accessed by a convenient menu. This collection is worth the price just for the DYNACOMP version of BLACKJACK.

GAMES PACK II (Available for all computers) Price: $14.95 Cassette/$18.95 Diskette
GAMES PACK II includes the games CRAZY EIGHTS, JOTTO, ACEY-DUCEY, LIFE, WUMPUS and others. As with GAMES PACK I, all the games are loaded as one program and are called from a menu. You will particularly enjoy DYNACOMP's version of CRAZY EIGHTS.
Why pay $9.95 or more per program when you can buy a DYNACOMP collection for just $14.95?

MOON PROBE (Available for all computers) Price: $12.95 Cassette/$16.95 Diskette
This is an extremely challenging "lunar lander" program. The user must drop from orbit to land at a predetermined target on the moon's surface. You control the thrust and orientation of your craft plus direct the rate of descent and approach angle. Runs in 16K Atari.

SPACE TRAP (Atari only, 16K) Price: $14.95 Cassette/$18.95 Diskette
This galactic "shoot 'em up" arcade game places you near a black hole. You control your spacecraft using the joystick and attempt to blast as many of the alien ships as possible before the black hole closes about you.

SUPER SUB CHASE (Atari only) Price: $19.95 Cassette/$23.95 Diskette
SUPER SUB CHASE simulates a search and destroy mission. Set your course and keep an eye on the sonar readings as you hunt for the hidden submarine. Set the depth charge explosion depth and watch them sink towards the sub. This is an addictive game which takes advantage of the Atari's graphics and sound capabilities. One or two players. Joystick(s) required.

TWO PLAYER GAMES

NEW

TWO PLAYER GAMES (Available for all computers; 32K disk/diskette only)
DYNACOMP has acquired the distribution rights to the best eight of Xitron's war games. These two-player games were originally written for the North Star computer, but have since been converted to play on all of the computers currently supported by DYNACOMP. Because our licensing and development costs were so low, DYNACOMP offers these programs two to a disk(ette) for only $19.95/diskette, $23.95/disk. If you like war games, then this is a bargain you can not pass up.

Set #1: **PANZER and BLITZKRIEG**
PANZER
Date: 23 Nov. 1943 Place: Several miles west of Kiev, Russia. The Russians have just liberated Kiev and are moving quickly to reach the German forces which are preparing for a last desperate attempt to halt the Russian advance.
BLITZKRIEG
Date: Spring 1940 Place: Northern France. The German blitzkrieg in the east was complete. Germany had turned its attention to the west: France. The German forces has penetrated the Ardennes and Meuse. The heroism of Dunkirk, the defense of the Aisne-Somme position, and the final collapse of the French armies in the south has all passed. And, now, the drive on Paris . . .

Set #2: **STARSHIP TROOPERS and INVASION OF THE MUD PEOPLE**
STARSHIP TROOPERS
Date: Fortieth Century Place: Arachnid planet of Sheol. The first all-out battle on the planet Sheol which will match equal forces of Terran and alien units. The outcome will set the course of the conflict, for the planet of Sheol is a key position in the solar war.
INVASION OF THE MUD PEOPLE
A Peruvian army battalion has been dispatched to a remote village area to investigate the destruction of many local dwellings and the disappearance of most of the villagers. Eye-witnesses have reported strange creatures appearing from scores of slimy mud holes which have oddly begun forming across the terrain.

Set #3: **FALL OF THE THIRD REICH and ARMORCAR**
FALL OF THE THIRD REICH
Date: March, 1945 Place: Remagen, Germany. The allies under General Eisenhower had reached the Rhine. The Germans had failed in destroying the Ludendorff railroad bridge, allowing several allied divisions to cross before it finally collapsed on March 17 ... and so, the allies began their drive on Berlin.
ARMORCAR
Date: 2 Feb. 1944 Place: Minsk, Russia. A German front-line unit is hard pressed for radio equipment and medical supplies. A relief convoy of armored cars must reach them through partisan-infested territory.

Set #4: **MOUNT SURIBACHI and MIDDLE EARTH**
MOUNT SURIBACHI
Date: 16 Feb. 1945 Place: Iwo Jima. The Japanese opened fire from Mount Suribachi as the marines landed on the porkchop-shaped island. Gunfire from the hill could cover the entire island, thus it was a critical objective if the Americans were to capture and utilize the all-important air field. Mount Suribachi proved to be one of the most strongly defended positions in the Japanese theatre of war.
MIDDLE EARTH
Date: 1997 Place: MIDDLE EARTH. Through a maze of tunnels, crevices, and rocky passageways discovered leading from an inactive volcano in South America, a team of United Nations' researchers have undertaken a mission to an uncharted frontier: the center of the Earth. After a perilous journey spanning a period of several months, the mission has arrived at the Earth's core, a land of flames, steam, oceans, and unforeseen vegetation. And then the creatures of MIDDLE EARTH appeared . . . unmatched by the most frightening horror stories created by man . . .

MISCELLANEOUS

CRYSTALS (Atari only) Price: $14.95 Cassette/$18.95 Diskette
A unique algorithm randomly produces fascinating graphics displays accompanied with tones which vary as the patterns are built. No two patterns are the same, and the combined effect of the sound and graphics are mesmerizing. CRYSTALS has been used in local stores to demonstrate the sound and color features of the Atari. Runs in 16K.

NORTH STAR SOFTWARE EXCHANGE (NSSE) LIBRARY
DYNACOMP now distributes the 23 volume NSSE library. These diskettes each contain many programs and offer an outstanding value for the purchase price. They should be part of every North Star user's collection. Call or write DYNACOMP for details regarding the contents of the NSSE collection.
Price: $9.95 each/$8.95 each (4 or more)
The complete collection may be purchased for $159.95.

NEW

5¼" DISKETTES (soft sectored/ten sectored) Price: $39.95/20 Diskettes
As you might imagine, DYNACOMP purchases diskettes in large quantities and at wholesale prices. We want to pass the savings along to you!

BUSINESS and UTILITIES

NEW **PORTFOLIO MANAGEMENT (Apple only)** Price: $69.95 two Diskettes

The PORTFOLIO MANAGEMENT package was written by a stock broker to help manage portfolios for individual customers. With this program data files can be easily created and kept up to date. A variety of reports can be generated for clients which are attractively and professionally laid out. The user may define his/her own investment catagories. PORTFOLIO MANAGEMENT is a top quality, professional tool which will not only provide you with new conveniences but will also serve to enhance your appearance as an efficient and up to date advisor to your clients. Comes complete on two diskettes along with a 30 page instruction manual.

NEW **PERSONAL FINANCE SYSTEM (Available for all computers)** Price: $39.95 Diskette

PFS is a single diskette, menu-oriented system composed of ten different programs. Besides recording your expenses and tax deductible items, PFS will sort and summarize expenses by payee, and display information on expenditures by any of 26 user defined codes by month or by payee. PFS will even produce monthly bar graphs of your expenses by category! This powerful package requires only one disk drive, minimal memory (24K Atari, 32K North Star) and will store up to 600 records per disk (and over 1000 records per disk by making a few simple changes to the programs). You can record checks plus cash expenses so that you can finally see where your money goes and eliminate guesswork and tedious hand calculations. Contains high speed machine language sort. PFS has been demonstrated on network (CBS) TV!

FAMILY BUDGET (Apple and Atari only) Price: $34.95 Diskette

FAMILY BUDGET is a very convenient financial record-keeping program. You will be able to keep track of cash and credit expenditures as well as income on a daily basis. You can record tax deductible items and charitable donations. FAMILY BUDGET also provides a continuous record of all credit transactions. You can make daily cash and charge entries to any of 21 different expense accounts as well as to 5 payroll and tax accounts. Data are easily retrieved giving the user complete control over an otherwise complicated (and unorganized!) subject.

NEW **TEXT MASTER (Apple 32K, diskette only)** Price: $49.95 Diskette

TEXT MASTER is a general purpose text editor for the Apple II computer. It features powerful, English-oriented commands which permit the complete manipulation of textural information. The information treated may be correspondence, computer programs, data to be used by other programs, and more. TEXT MASTER also interfaces with any printer connected to your Apple. The minimum system requirements are 32K of RAM, Applesoft on ROM, at least one disk, and a lower case adapter. TEXT MASTER can process any length file segment by segment. Thus it is possible to process files as large as a diskette. Comes complete with an efficient 16 page manual. TEXT MASTER is equivalent in capability to many word processing systems costing 3 x or more in price. The commands available in TEXT MASTER are: COLLECT, USE, EXECUTE, NONUM, INSERT, MERGE, STOP, RENUM, DELETE, SAVE, COPY, FREE, REPLACE, WAIT, MOVE, LENGTH, LIST, RESAVE, CLEAR, AUTO, RETRY, APPEND, SET, MANUAL, CHANGE, SCRATCH, SHOW, CATALOG, MODIFY, COMPARE, NUM, DISPLAY, HELP.

INTELINK (Atari only) Price: $49.95 Diskette

This software package contains a menu-driven collection of programs for facilitating efficient two-way communications through a full duplex modem (required for use). In one mode of operation you may connect to a data service (e.g., The SOURCE or MicroNet) and quickly load data such as stock quotations onto your diskette for later viewing. This greatly reduces "connect time" and thus the service charge. You may also record the complete contents of a communications session. Additionally, programs written in BASIC, FORTRAN, etc. may be built off-line using the support text editor and later "uploaded" to another computer, making the Atari a *very* smart terminal. Even Atari BASIC programs may be uploaded. Further, a command file may be built off-line and used later as controlling input for a time-share system. That is, you can set up your sequence of time-share commands and programs, and the Atari will transmit them as needed: batch processing. All this adds up to saving both connect time and your time.

NEW **PAYFIVE (Apple II plus diskette, two drives required)** Price: $149.95

This is an enormously flexible employee payroll system with extraordinarily good human engineering features. PAYFIVE prints checks and compiles the required federal, state and local forms for up to 148 employees. The pay methods may be hourly, salary, commission or any combination. There are multiple options for pay periods, and they also can be used in any combination. PAYFIVE includes *many* other features and comes extremely well documented with a 200 page manual. The manual may be purchased separately for $30, and that payment later applied to the software purchase.

SHOPPING LIST (Atari only) Price: $12.95 Cassette/$16.95 Diskette

SHOPPING LIST stores information on items you purchase at the supermarket. Before going shopping, it will remind you of all the things you might need, and then display (or optionally print) your shopping list and the total cost. Adding, deleting, changing and storing data is very easy. Runs with 16K.

NEW **TAX OPTIMIZER (Available for all computers)** Price: $59.95 Diskette

The TAX OPTIMIZER is an easy-to-use, menu-oriented software package which provides a convenient means for analyzing various income tax strategies. The program is designed to provide a quick and easy data entry. Income tax is computed by all tax methods (regular, income averaging, maximum and alternate minimum tax). The user may immediately observe the tax effect of critical financial decisions. TAX OPTIMIZER has been thoroughly field tested in CPA offices and comes complete with the current tax tables in its data files. TAX OPTIMIZER is tax deductible!

STOCK MASTER/STOCK PLOT (Apple 48K) Price: $59.95 Diskette

This is a full-featured stock portfolio management and analysis system. Ten years of records on up to thirty stocks may be maintained. You may record prices, revenue, earnings/share, ROE, quarterly earnings and dividends, transactions, long/short term gains, P/E, indexes (DJ, S & P, NASDAQ) and MORE! You may plot (HIRES) the price history of any stock against any other, time, or the indexes. Portfolio value may be evaluated at any time. Comes complete with superbly written instructions and sample files on a second diskette.

TURNKEY AND MENU (Atari only) Price: $17.95 Diskette

TURNKEY is a utility program which allows you to create autoboot/autorun diskettes easily. Simply load and run TURNKEY, load the program diskette to be modified, and answer the questions! The TURNKEY diskette also comes with DOS 2.0 and includes another program, MENU. MENU lists the contents of your diskette alphabetically, and permits the running of any BASIC program on the diskette by typing a single key. TURNKEY and MENU provide you with the ability to run any program on your diskette by simply turning on the computer and pressing a single key.

STOCKAID (Atari only) Price: $29.95 Diskette

STOCKAID provides a powerful set of tools for stock market analysis. With STOCKAID you can display point and figure charts, as well as bar charts with oscillators. You can also examine long term moving averages and on-balance volume features. STOCKAID allows you to input daily data with a single diskette storage capability of 239 days x 16 stocks. Included are stock dividend and split adjustment capabilities. A very professional package!

NEW **NYINDEX (Atari only)** Price: $29.95 Diskette

NYINDEX is a comprehensive software package for storing, retrieving and plotting New York Stock Exchange information. The daily data treated includes the composite index, advances, declines, new highs and new lows. Graphical displays include the above plus the index oscillator, cumulative advances/declines and moving averages. Data entry and editing is easy. The diskette includes more than two years of daily data. NYINDEX is an excellent companion to STOCKAID.

PLAYER-MISSILE GRAPHICS TABLET (Atari only) Price: $19.95 Diskette

The PLAYER-MISSILE GRAPHICS TABLET was designed to take the drudgery out of developing four color displays in GRAPHICS MODE 7. No longer will you have to read the locations of those tiny blocks on your graph paper and calculate PLOTs and DRAWTOs. With PMG you will be able to easily design colorful graphic displays with your joystick and save them on diskette for later recall.

LIFE CYCLE ANALYSIS AND DEPRECIATION (Apple diskette only) Price: $39.95 Diskette

This software package creates a data file of business expenses for equipment which can later be used to calculate and display a variety of reports. You may project annual costs, find the present worth, create depreciation schedules and justify tax deductions. The evaluation techniques conform to standards set by federal agencies. This is an invaluable package for any businessman who has invested in equipment. LIFE CYCLE ANALYSIS features an easy to use data file creation section and provides formatted hardcopy reports for use in presentations or for tax record keeping purposes. When used for generating tax information, this package is tax deductible! Requires 48K. Comes on two diskettes.

NEW **MICROMAGIC (Apple diskette only)** Price: $39.95 Diskette

The emphasis of this program is clearly the MAGIC! MICROMAGIC offers outstanding versatility in its ability to function as a stand alone entertainment package or as a utility program to create stunning *animated* graphics for use in other programs. The secret lies in MICROMAGIC's special on screen graphics editor. You control a graphics cursor directly from the keyboard, creating high resolution images using all 16 available colors. When you are done with a picture, it can be saved on disk with a single key command. Up to 24 images can be saved as "frames" of a movie, and then played back at high speed to creat short animated sequences. The effects are truly stunning.

This package comes complete with demonstration programs so that even novice users can get immediate results. No programming skills are necessary to use MICROMAGIC. If you have been frustrated by the effort required to create graphics images with your computer, MICROMAGIC will delight you.

SHAPE MAGICIAN (Apple II, 48K, diskette only) Price: $29.95

At last! An utility for painlessly creating graphics shapes for the Apple. Create, edit and save up to 30 shapes which can then be used to develop arcade games or to simply enhance your programs. Add that professional touch!

ORDERING INFORMATION

All orders are processed and shipped within 48 hours. Please enclose payment with order and include the appropriate computer information. If paying by VISA or Master Card, include all numbers on card. Purchase orders accepted.

Shipping and Handling Charges
Within North America: Add $2.00
Outside North America: Add 15% (Air Mail)

Delivery
All orders (excluding books) are sent First Class.

Quantity Discounts
Deduct 10% when ordering 3 or more programs; 20% when ordering 5 or more. Dealer discount schedules available upon request.

8" CP/M Disks
Add $2.50 to the listed diskette price for each 8" floppy disk (IBM soft sectored CP/M format). Programs run under Microsoft MBASIC or BASIC-80.

5¼" CP/M Disks
All software available on 8" CP/M disks is also available on 5¼" disks, North Star, Osborne, Superbrain and NEC format.

Ask for DYNACOMP programs at your local software dealer. Write for detailed descriptions of these and other programs from DYNACOMP.

DYNACOMP, Inc. (Dept. C)
1427 Monroe Avenue
Rochester, New York 14618
24 hour message and order phone: (716) 442-8731
Toll free order phones: (800) 828-6772
(800) 828-6773
Office phone (9AM-5PM EST): (716) 442-8960
New York State residents please add 7% NYS sales tax.

EDUCATION

HODGE PODGE (Apple 48K only) Price: $14.95 Cassette/$18.95 Diskette

Let HODGE PODGE be your child's teacher. Pressing any key on your Apple will result in a different and intriguing "happening" related to the letter or number of the chosen key. The program's graphics, color and sound are a delight for children from ages 1½ to 7. HODGE PODGE is a non-intimidating teaching device which brings a new dimension to the use of computers in education. See the excellent reviews of this very popular program in INFOWORLD and SOFTALK.

TEACHER'S AIDE (Atari and PET only) Price: $13.95 Cassette/$17.95 Diskette

TEACHER'S AIDE consists of three basic modules contained in one program. The first module provides addition and subtraction exercises of varying levels of difficulty. The second module consists of multiplication problems in which the student may be tested both on the final answer and/or on the subtotal answers in the long hand procedure. Several levels of complexity are provided here as well. The third module consists of division problems; one particularly nice feature of the division module is that the long hand division steps can be displayed along with the remainder in order to clearly demonstrate the procedure by which the remainder is derived. Using TEACHER'S AIDE is not merely a drill, but rather a learning experience.

STATISTICS and ENGINEERING

DIGITAL FILTER (Available for all computers) Price: $39.95 Cassette/$43.95 Diskette

DIGITAL FILTER is a comprehensive data processing program which permits the user to design his own filter function or choose from a menu of filter forms. In the explicit design mode the shape of the frequency transfer function is specified by directly entering points along the desired filter curve. In the menu mode, ideal low pass, high pass and bandpass filters may be approximated to varying degrees according to the number of points used in the calculation. These filters may optionally also be smoothed with a Hanning function. In addition, multi-stage Butterworth filters may be selected. Features of DIGITAL FILTER include plotting of the data before and after filtering, as well as display of the chosen filter functions. Also included are convenient data storage, retrieval and editing procedures.

DATA SMOOTHER (Not available for Atari) Price: $19.95 Cassette/$23.95 Diskette

This special data smoothing program may be used to rapidly derive useful information from noisy business and engineering data which are equally spaced. The software features choice in degree and range of fit, as well as smoothed first and second derivative calculation. Also included is automatic plotting of the input data and smoothed results.

FOURIER ANALYZER (Available for all computers) Price: $19.95 Cassette/$23.95 Diskette

Use this program to examine the frequency spectra of limited duration signals. The program features automatic scaling and plotting of the input data and results. Practical applications include the analysis of complicated patterns in such fields as electronics, communications and business.

TFA (Transfer Function Analyzer) Price: $19.95/$23.95 Diskette

This is a special software package which may be used to evaluate the transfer functions of systems such as hi-fi amplifiers and filters by examining their response to pulsed inputs. TFA is a major modification of FOURIER ANALYZER and contains an engineering-oriented decibel versus log-frequency plot as well as data editing features. Whereas FOURIER ANALYZER is designed for educational and scientific use, TFA is an engineering tool. Available for all computers.

HARMONIC ANALYZER (Available for all computers) Price: $24.95 Cassette/$28.95 Diskette

HARMONIC ANALYZER was designed for the spectrum analysis of repetitive waveforms. Features include data file generation, editing and storage/retrieval as well as data and spectrum plotting. One particularly unique facility is that the input data need not be equally spaced or in order. The original data is sorted and a cubic spline interpolation is used to create the data file required by the FFT algorithm.

FOURIER ANALYZER, TFA and HARMONIC ANALYZER may be purchased together for a combined price of $51.95 (three cassettes) and $63.95 (three diskettes).

REGRESSION I (Available for all computers) Price: $19.95 Cassette/$23.95 Diskette

REGRESSION I is a unique and exceptionally versatile one-dimensional least squares "polynomial" curve fitting program. Features include very high accuracy; an automatic degree determination option; an extensive internal library of fitting functions; data editing; automatic data, curve and residual plotting; a statistical analysis (e.g.: standard deviation, correlation, coefficient, etc.) and much more. In addition, new fits may be tried without reentering the data. REGRESSION I is certainly the cornerstone program in any data analysis software library.

REGRESSION II (Available for all computers) Price: $19.95 Cassette/$23.95 Diskette

PARAFIT is designed to handle those cases in which the parameters a imbedded (possibly nonlinearly) in the fitting function. The user simply inserts the functional form, including the parameters (A(1), A(2), etc.) as one or more BASIC statement lines. Data, results and residuals may be manipulated and plotted as with REGRESSION I. Use REGRESSION I for polynomial fitting, and PARAFIT for those complicated functions.

MULTILINEAR REGRESSION (MLR) (Available for all computers) Price: $24.95 Cassette/$28.95 Diskette

MLR is a professional software package for analyzing data sets containing two or more linearly independent variables. Besides performing the basic regression calculation, this program also provides easy to use data entry, storage, retrieval and editing functions. In addition, the user may interrogate the solution by supplying values for the independent variables. The number of variables and data size is limited only by the available memory.

REGRESSION I, II and MULTILINEAR REGRESSION may be purchased together for $51.95 (three cassettes) or $63.95 (three diskettes).

ANOVA (Not available on Atari cassette or for PET/CBM) Price: $39.95 Cassette/$43.95 Diskette

In the past the ANOVA (analysis of variance) procedure has been limited to the large mainframe computers. Now DYNACOMP has brought the power of this method to small systems. For those conversant with ANOVA, the DYNACOMP software package includes the 1-way, 2-way and N-way procedures. Also provided are the Yates 2^{K-P} factorial designs. For those unfamiliar with ANOVA, do not worry. The accompanying documentation was written in a tutorial fashion (by a professor in the subject) and serves as an excellent introduction to the subject. Accompanying ANOVA is a support program for building the data base. Included are several convenient features including data editing, deleting and appending.

BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2 (Not available for Atari)

DYNACOMP is the exclusive distributor for the software keyed to the popular texts *BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2* by F. Ruckdeschel (see advertisements in BYTE magazine). These subroutines have been assembled according to chapter. Included with each collection is a menu program which selects and demonstrates each subroutine.

Volume 1
Collection #1: Chapters 2 and 3 - Data and function plotting; complex variables and functions.
Collection #2: Chapter 4 - Extended matrix and vector operations.
Collection #3: Chapters 5 and 6 - Random number generators (Poisson, Gaussian, etc.); series approximations.
Price per collection: $16.95 Cassette/$20.95 Diskette
All three collections are available for $44.95 (three cassettes) and $53.95 (three diskettes).
Volume 2
Collection #1: Chapter 1 - Linear, polynomial, multidimensional, parametric least squares.
Collection #2: Chapter 2 - Series approximation techniques (economization, inversion, reversion, shifting, etc.)
Collection #3: Chapter 3 - Functional approximations by iteration and recursion.
Collection #4: Chapter 4 - CORDIC approximations to trigonometric, hyperbolic, exponential and logarithmic functions.
Collection #5: Chapter 5 - Table interpolation, differentiation and integration (Newton, LaGrange, splines).
Collection #6: Chapter 6 - Methods for finding the real roots of functions.
Collection #7: Chapter 7 - Methods for finding the complex roots of functions.
Collection #8: Chapter 8 - Optimization by steepest descent.
Price per collection: $14.95 Cassette/$18.95 Diskette

All eight collections are available for $99.95 (eight cassettes) and $129.95 (eight diskettes).
Because the texts are a vital part of the documentation, *BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2* are available from DYNACOMP:

BASIC SCIENTIFIC SUBROUTINES, Vol. 1 (319 pages): $19.95 + 75¢ postage
BASIC SCIENTIFIC SUBROUTINES, Vol. 2 (790 pages): $23.95 + $1.50 postage

See reviews in KILOBAUD, Dr. Dobbs, and ACCESS.

NEW **SOFTNET (Apple II and TRS-80 48K diskette only)** Price: $129.95

SOFTNET may be used to create models of liquid pipeline systems to evaluate their flow performance. Up to 150 nodes with up to 150 connecting elements may be simulated, and models may be combined to form yet larger models. If you are involved in water distribution systems, chemical fluid flow problems, building plumbing, or similar situations, this is an ideal analysis tool.

NEW **FILTER ANALYSIS (Apple only)** Price: $19.95 Cassette/$23.95 Diskette

FILTER ANALYSIS is the ideal program for determining the frequency response of passive filters. Any number of RLC components may be included, and any number of poles treated. FILTER ANALYSIS features its own mini-language which makes circuit description simple. Results may be printed in tabular form or plotted in HIRES graphics (decibels versus log-frequency).

ACTIVE CIRCUIT ANALYSIS (Available for all computers) Price: $35.95 Cassette/$39.95 Diskette

With ACAP you may analyze the response of an active or passive component circuit. The circuit may be probed at equal steps in frequency, and the resulting complex voltages at each component juncture examined; the frequency response of a filter or amplifier may be completely determined with respect to both amplitude and phase. In addition, ACAP prints a statistical analysis of the range of voltage responses which result from tolerance variations in the components. ACAP is easy to learn and use. Circuit descriptions may be saved onto cassette or diskette to be recalled at a later time for execution or editing. ACAP should be part of every circuit designer's program library. Requires 48K.

LOGIC SIMULATOR (Available for all computers) Price: $35.95 Cassette/$39.95 Diskette

Test your complicated digital logic design with respect to given set of inputs to determine how well the circuit will operate. The elements which may be simulated include multiple input AND, OR, NOR, EXOR, EXNOR and NAND gates, as well as inverters, J-K and D flip-flops, and one-shots. Inputs may be clocked in with varying clock cycle lengths/displacements and delays may be introduced to probe for glitches and race conditions. A timing diagram for any given set of nodes may be plotted. Save your breadboarding until the circuit is checked by LOGIC SIMULATOR. Requires 48K.

NEW **BEAM DEFLECTION (Available for all computers) (disk/diskette only)** Price: $29.95 Diskette/$32.45 Disk

BEAM DEFLECTION is the first in DYNACOMP's new series of structural analysis software packages. It consists of two programs. The first program permits the development of data files which describe the problem. For example, the ends of the beam may be pinned, clamped or free. The beam may be uniformly supported by an elastic bed, or held up by springs variously placed and having differing spring constants. The elasticity and cross section of the beam may vary along its length. The load may be uniformly distributed or it may include discrete forces. The beam may be pinned at various points along its length. And so on. All this information may be easily entered and edited using the data input program.

Following this the analysis program is called. The calculated results are the stress and deflections of the beam, both in numerical and graphical form. since the input data is saved, cases may be easily re-run with modification, thereby permitting iterative design.

The documentation which comes with BEAM DEFLECTION clearly shows how to use the software. In addition, three text problems are described and demonstrated to ensure that you understand how to use the program. Also, helpful theoretical information is supplied in the appendix.

STATTEST (Not available on Atari cassette or for PET/CBM) Price: $19.95 Cassette/$23.95 Diskette

This is a statistical inference package which helps you make wise decisions in the face of uncertainty. In an interactive fashion you can build and edit data files and test the differences in means, variances and proportions. STATTEST will also perform data analysis as well as do linear correlation and regression. This menu-directed statistical workhorse is rounded out with a chi-square contingency test and a (uniform and normal) random sample generator. The documentation is written by a college professor who guides you through the various tests.

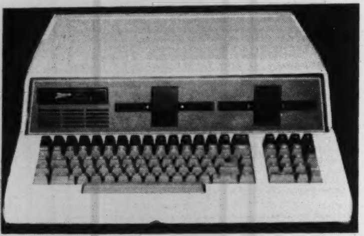
ABOUT DYNACOMP

DYNACOMP is a leading distributor of small system software with sales spanning the world (currently in excess of 50 countries). During the past three years we have greatly enlarged the DYNACOMP product line, but have maintained and improved our high level of quality and customer support. The achievement in quality is apparent from our many repeat customers and the software reviews in such publications as COMPUTRONICS, 80 Software Critique, A.N.A.L.O.G., Softalk, Creative Computing and Kilobaud. DYNACOMP software has also been chosen for demonstration on network television. Our customer support is as close as your phone. It is always friendly. The staff is highly trained and always willing to discuss products or give advice.

CIRCLE 160 ON READER SERVICE CARD

Zenith Dual MPU Systems

Zenith Data Systems introduced the Z100 series of desktop computers which have as standard features both 8- and 16-bit microprocessors, a five-slot S-100 expansion chassis, two built-in 320K 5 1/4" diskette drives, 128K RAM, color graphics with control of eight colors and 144,000 dots, and keyboard in a single housing. Memory is expandable on all models to 768K.



The computers use the IEEE 696 expansion chassis (commonly called the S100 bus), which enables the use of a wide variety of S100 options.

Digital color or RGB output is standard on both versions of the Z100. The low-profile version also has monochrome composite video output.

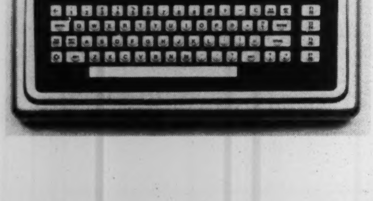
It also uses CP/M on the 8-bit side of the computer, which makes transfer of 8-bit software to the Z100 possible, while Z-DOS and the diskette format of the Z100 make most software for the IBM personal computer available to the new Zenith computers. The retail price of a Z100 system including software is less than $5000.

Zenith Data Systems, 1000 Milwaukee Ave., Glenview, IL 60025. (312) 391-8181.

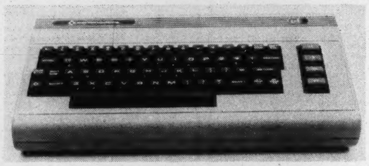
CIRCLE 346 ON READER SERVICE CARD

Five from Commodore

The Commodore Max Machine is a three-in-one home computer/game machine/music synthesizer which includes an array of arcade games, educational and musical programs and peripherals. It has a 40-column x 25-line screen and 16 colors. The sound system produces three independent voices, each with a nine-octave range, contains a programmable ADSR generator and a programmable filter, and has variable resonance. $179.95.



The Commodore 64 gives home and business users 64K computing capability along with "three-dimensional-style" color game graphics and music synthesis. The Commodore 64 can use VIC-20 peripherals and can also use many programs and files created for Commodore's line of PET and CBM education- and business-oriented computers. It has a 40-column x 25-line screen and 16 colors, as well as 64K RAM. $595.



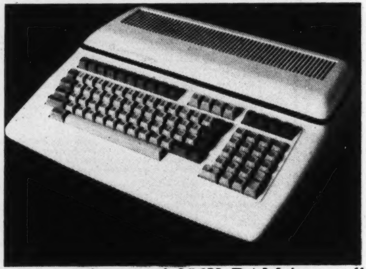
The Commodore Information Network, is a user-oriented telecommunications service that allows home computerists to get technical assistance, exchange programming tips, access Commodore product information and play games. Users of Commodore's VIC-20 home computer can access the service with the VICmodem cartridge and a modular telephone. With the purchase of a VICmodem, Commodore provides a free one-year subscription to CompuServe, and one free hour of time on the CompuServe network.

Thirteen cartridge games—including three Bally/Midway arcade games—for the VIC-20 are now available. Commodore also has a complete range of peripheral products for the VIC, including a single disk drive, graphic printer, VICmodem, and 16K memory expansion cartridge. The Bally/Midway games are *Gorf*, *Omega Race*, and *Wizard of Wor*. Commodore's own *Space Vulture*, *Raid on Fort Knox* and *Pinball Spectacular* are also available, as are *Mole Attack* and *The Sky is Falling*, Commodore's children's cartridge games. The five Scott Adams adventures are also available.

Commodore also introduced the BX256 16-bit multiprocessor professional microcomputer, featuring 256K user memory (RAM), the BX256 is an enhanced version of Commodore's B series microcomputer and has two processors, including a 16-bit 8088 for CP/M-86. It also has an 80-column screen and built-in dual disk drives. It is expandable to a maximum of 256K RAM internally with 640K externally, and can accommodate an optional Z80 processor board. $2995.

Commodore also has the B128 microcomputer which features 128K user memory (RAM), an attached 80-column screen and built-in dual drive. B series computers are expandable to a maximum of 256K RAM internally with potential for 640K externally, and accommodate an optional Z80 processor board to provide CP/M compatibility. $1695.

The P128 microcomputer is the third generation of the PET series. The P128, which connects directly to a television set monitor via built-in RF modulator, features 128K RAM, 40 columns by 25 lines display, and 16 colors for either text or graphics. The P128 also features a high resolution graphic display of 320 by 200 pixels. Storage in the P128 is expandable to a maximum of 256K RAM internally and 640K externally. This third-generation machine also becomes a multiprocessor system via a Commodore-designed Z80 processor board that offers CP/M compatibility. $995.



A "Family" of "Easy" spreadsheet programs has also been introduced by Commodore. The four new programs, EasyCalc, EasyPlot, Easy Tools, and EasyScan, run on SuperPet and Commodore 64 micros. EasyCalc is $149.95 for the SuperPet and $99.95 for the Commodore 64. EasyPlot for the SuperPet is $149.95 and $99.95 for the Commodore 64. Commodore dealers have EasyTools for the SuperPet for $124.95 and for the Commodore 64 for $79.955. EasyScan is $124.95 for the SuperPet and $79.95 for the Commodore 64.

Commodore Business Machines, Inc., Computer Systems Division, The Meadows, 487 Devon Park Dr., Wayne, PA 19087. (215) 687-9750.

CIRCLE 347 ON READER SERVICE CARD

IBM PERSONAL COMPUTER USERS™

COMPLETE YOUR REFERENCE LIBRARY

Que On Systems
IBM's PERSONAL COMPUTER
que

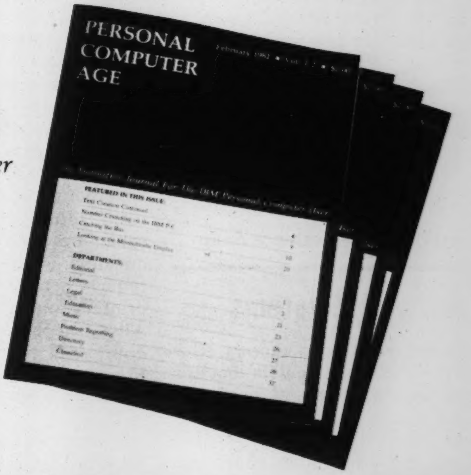
Que On Systems

IBM's PERSONAL COMPUTER

Que Corporation's new 300 page book, IBM's PERSONAL COMPUTER describes the hardware, peripherals and IBM's program library. Whether you are an IBM Personal Computer user or prospective buyer, you will discover the significance of IBM's new product to your personal or business applications.

...at computer stores and fine book stores $14.95

and...



PERSONAL COMPUTER AGE

The Definitive Journal For The IBM Personal Computer User

Keeps you updated monthly with the latest news and applications for your IBM Personal Computer. Featuring: Hardware and Software Reviews — New Product Announcements — Technical Articles — Problem Reporting — Vendor Directory — Classified Ads — Special Interest Columns.

$18.00/YR.
(12 issues)

BOTH FOR ONLY $22.95

PERSONAL COMPUTER AGE

For Credit Card Orders, Dial Toll Free
(800) 227-2634 ext. 936
In California
(800) 772-2666 ext.936

☐ I Want Everything — PERSONAL COMPUTER AGE and IBM's PERSONAL COMPUTER for $22.95

☐ NEW ☐ RENEWAL

☐ Send the Book only for $14.95

☐ Just enter my subscription to PERSONAL COMPUTER AGE for $18.00

☐ Payment Enclosed

Charge my: ☐ VISA ☐ MASTER CHARGE

Card # ________________

Expiration Date: ________________

Authorized Signature

Name

Address

City

State Zip

PERSONAL COMPUTER AGE P.O. BOX 70725 Pasadena, California 91107 Dept.HC

Lobo Personal Computer

Lobo Drives International introduced the MAX-80 personal computer.

The streamlined keyboard unit houses the 5 MHz Z80, 64K RAM, two RS-232C serial ports, a built-in Centronics-type parallel port, a buffered bus expansion connector, and built-in controllers for all standard floppy disk drives as well as a hard disk interface.

The MAX-80 supports two business-oriented operating systems—the TRSDOS-compatible LDOS and CP/M.

Standard 80 x 24, 64 x 16 and 16 x 32 video display modes are all software selectable, and both text and graphics characters are generated in user-accessible RAM. The 76-key keyboard with a numeric pad and four function keys also houses a real-time clock with self-charging backup battery. The complete MAX-80 keyboard unit is priced at $800 and the high-resolution, green screen monitor is priced at $150.

Lobo Drives International, 358 S. Fairview Ave., Goleta, CA 93117. (805) 683-1576.

CIRCLE348 ON READER SERVICE CARD

Altos Network Systems

Altos Computer Systems announced a family of 16-bit microcomputers that are compatible with a variety of operating systems and business application software programs.

Based on the Intel 8086 microprocessor, the ACS8600 systems allow up to eight users to share up to a million bytes of main (RAM) memory, plus on line floppy Winchester hard disk storage of from 1 to 80 megabytes. They feature error detection and correction and a memory management system.

The basic system, with 512K RAM, 20Mb hard disk, and floppy disk backup, lists for $12,500. The 40Mb system is also available with up to 80Mb possible using an upgrade kit. Mag tape cartridge (17Mb) backup is available too.

The family supports the Xenix operating system—Bell Lab's Unix, version 7 adapted by Microsoft—as well as CP/M-86, MP/M-86 and Oasis-6.

Languages supporting end user applications are Microsoft versions of Basic, Cobol, Pascal, and Fortran, as well as Cis-Cobol, RM-Cobol, Pascal/M-86 and C-Basic-86.

In addition to eight terminals and peripherals, the system allows expansion through a Multibus port and accepts both synchronous (bisync) and asynchronous (async) communications protocols. It can handle network data rates of up to 800 kilobaud for high speed networking.

A dual drive floppy disk controller contains one megabyte of storage on two single sided, double density disks. Eight-inch Winchester disks are available in 10Mb, and 40Mb capacities. Floppy disks for backup accept 500K on a single disk, and mag tape systems are available with higher capacities.

Altos also announced Ethernet computer networking capability for its 16-bit microcomputers, and an economical Altos-to-Altos high speed networking scheme called Altos-Net.

The networks implement Altos-Net/Unet networking software, running under the Xenix version of the Unix operating system. Because the two networking schemes—inter-Altos and Ethernet—share the same software, upgrading is possible.

Ethernet will permit the networking of up to 100 Altos 16-bit computers, with up to eight users per CPU. As an alternative, inter-Altos networking can be accomplished with Altos-Net/Unet software utilizing twisted pair cabling with high speed transmission speeds.

Three functional layers make up an Ethernet network: The network medium itself—consisting of shielded coaxial cable, transceivers, interfaces, and terminators; users—who initiate actions and request services; and servers—such as printers and other shared peripherals. Altos computers can be directly (locally) connected to Ethernet through Altos' Ethernet interface as well as indirectly (remotely) connected via telephone lines.

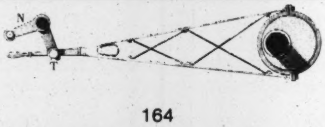
The Altos-Net/Unet software package uses the Internet Protocol (IP) and Transmission Control Protocol (TCP) to provide operating systems support for OEMs and software houses wishing to develop distributed applications.

At the applications level, the software provides file transfer capability, and electronic mail and terminal emulation protocols.

Altos' implementation of Ethernet costs $2,500 per CPU, which includes Altos-Net/Unet networking software and the Ethernet controller. Cabling and transceivers are extra.

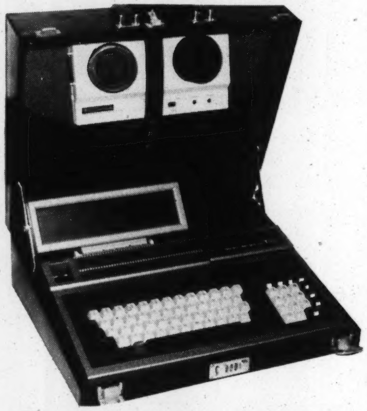
Altos Computer Systems, 2360 Bering Dr., San Jose, CA 95131. (408) 946-6700.

CIRCLE 349 ON READER SERVICE CARD



Toshiba Personal Computer

The Toshiba T100 personal computer has a 64K RAM. It also uses a 32K ROM for Basic and a 16K RAM for video. The T100 can accept four double sided, double density, 5 1/4" floppy disks each holding 280 kilobytes. It features a 90-key detached keyboard and a choice of five I/O video screen options, including a flat-panel liquid crystal display showing eight lines of 40 characters each.



Three other products announced by Toshiba America, Inc. are the P1350 LetterPerfect printer, OCR-V100 page reader, and DF-2100 document filing system.

TAI's P1350 LetterPerfect printer operates at 100 characters per second in word processing applications and at 160 cps for data processing jobs. The printer provides graphics production capability and handles interchangeable character fonts. It also provides friction or tractor paper feed of up to five-part copy.

The OCR-V100 page reader is a data entry unit which reads at 250 cps and recognizes a variety of typewriter fonts separately or in combination.

Toshiba's DF-2100 document filing system features charge-coupled device (CCD) technology for input, a laser disk system for filing, and a laser print system for hardcopy output. The unit stores up to 10,000 pages of text on laser disks measuring 30 centimeters in diameter.

Toshiba America, Inc., 2441 Michelle Dr., Tustin, CA 92680. (714) 730-5000.

CIRCLE 350 ON READER SERVICE CARD

NEC PC-6000 System

NEC Home Electronics has introduced the PC-6000 computer system. It features a combination of educational and home entertainment capabilities. The basic PC-6000 system (microcomputer keyboard) attaches to a standard B&W or color television.

SUPER DISCOUNT PRICES

APPLE®

SOFTWARE FOR BUSINESS AND ENTERTAINMENT

ADVENTURE INTERNATIONAL

Apple Spice (D)	$20.95
Eliminator (D)	$20.95
Planetoids "Asteroids" (D)	$17.95
Pirate's Adventure (D)	$20.95
The Count (D)	$20.95
Pyramid of Doom (D)	$20.95
Ghost Town (D)	$20.95
Savage Island I (D)	$20.95
Adventures 1, 2 & 3 (D)	$28.95
Adventures 4, 5 & 6 (D)	$28.95
Adventures 7, 8 & 9 (D)	$28.95
Adventures 10, 11 & 12 (D)	$28.95

ARTSCI

Magic Window (D)	$72.95
Magic Mailer (D)	$50.95
Magic Words (D)	$50.95

AUTOMATED SIMULATIONS

Temple of Apshai (D)	$28.95
Star Warrior (D)	$28.95
Rescue At Rigel (D)	$20.95
Datestones of Ryn (D)	$14.95
Crush Crumble & Ch. (D)	$20.95
Invasion Orion (D)	$17.95
Ricochet (D)	$14.95

AVALON HILL

Guns of Fort Defiance (D)	$17.95
B-1 Nuclear Bomber (C)	$11.95
Lords of Karma (C)	$14.95

AVANT-GARDE

Zero Gravity Pinball (D)	$20.95
HI RES Secrets (D)	$90.95
HI RES Computer Golf (D)	$20.95

BEAGLE BROS.

Dos Boss (D)	$16.95
Alpha Plot (D)	$28.95
Utility City (D)	$20.95
Tip Disk #1 (D)	$14.95

BRODERBUND SOFTWARE

Choplifter (D)	$24.95
Dueling Digits (D)	$20.95
Labyrinth (D)	$20.95
Star Blazer (D)	$22.95
Track Attack (D)	$20.95
Davids Midnight Magic (D)	$24.95
Space Quarks (D)	$20.95
Apple Panic (D)	$20.95
Alien Typhoon (D)	$17.95
Alien Rain "Galaxian" (D)	$17.95

CALIFORNIA PACIFIC

Apple-Oids (D)	$20.95
Akalabeth (D)	$24.95
Ultima (D)	$28.95

CAVALIER COMPUTER

Bug Attack (D)	$20.95
The Asteroid Field (D)	$17.95
Microwave (D)	$24.95
Star Thief (D)	$20.95

CONTINENTAL SOFTWARE

CPA#1 - General Ledger (D)	$187.95
CPA#2 - Accounts Rec. (D)	$187.95
CPA#3 - Accounts Pay. (D)	$187.95
CPA#4 - Payroll (D)	$187.95
CPA#5 - Property Mgt. (D)	$369.95
The Home Accountant (D)	$52.95
The Home Money Minder (D)	$24.95
The Mailroom (D)	$24.95

DATAMOST

Tax Beater (D)	$95.95
Real Estate Anal. Prog. (D)	$95.95
Snack Attack (D)	$20.95
County Fair (D)	$20.95
Swashbuckler (D)	$24.95
Thief (D)	$20.95

EDU-WARE

Compu-Math/Arith. Skill (D)	$36.95
Compu-Math Frac. (D)	$28.95
Compu-Math Dec. (D)	$28.95
Spelling Bee W/Read (D)	$28.95
Algebra I (D)	$28.95
The Prisoner (D)	$20.95
Rendevous (D)	$28.95

GEBELLI

Russki Duck (D)	$24.95
Horizon V (D)	$24.95
Zenith (D)	$24.95

HAYDEN SOFTWARE

Sargon II (D)	$24.95
Reversal (D)	$24.95

HIGHLANDS COMPUTER

E-Z Ledger (D)	$43.95
Oldorf's Revenge (D)	$14.95
Creature Venture (D)	$17.95
Tarturian (D)	$17.95

HOWARD SOFTWARE

Tax Preparer 1982 (D)	$114.95
Creative Financing (D)	$134.95
Calif. State Tax Preparer (D)	$55.95
NY/NJ State Tax Preparer (D)	$55.95

INFOCOM

Zork I (D)	$28.95
Zork II (D)	$28.95

INNOVATIVE DESIGN

Pool 1.5 (D)	$24.95
Trick Shot (D)	$28.95
Juggler (D)	$20.95

IUS

Profes. Easy Writer (D)	$133.95
Profes. Easy Mailer (D)	$114.95
Datadex (D)	$114.95

MICRO LAB

Data Factory 5.0 (D)	$224.95
The Tax Manager (D)	$112.95
Visifactory (D)	$55.95
Visiblend (D)	$36.95
The Merger (D)	$36.95
US Constitution Tutor (D)	$20.95

MUSE

ABM (D)	$17.95
Robot War (D)	$28.95
Castle Wolfenstein (D)	$20.95
Super Text II	$114.95

ON-LINE

HI RES Mission Asteroids (D)	$14.95
HI RES Mystery House (D)	$17.95
HI RES Wiz & Princess (D)	$23.95
HI RES Ulysess (D)	$24.95
HI RES Soccer (D)	$20.95
Crossfire (D)	$20.95
Mousekattack (D)	$24.95
Threshold (D)	$28.95
Pegasus II (D)	$20.95
Frogger (D)	$24.95
Screenwriter II (D)	$97.95
The General Manager (D)	$114.95

PICCADILLY

Falcons (D)	$20.95
Star Blaster (D)	$20.95
Ribbit (D)	$20.95
Warp Destroyer (D)	$20.95

SIRIUS SOFTWARE

Gorgon (D)	$28.95
Sneakers (D)	$20.95
Epoch (D)	$24.95
Beer Run (D)	$20.95
Snake Byte (D)	$20.95
Cyclod (D)	$20.95
Bandits (D)	$24.95

SIR-TECH

Galactic Attack (D)	$20.95
Wizardry (D)	$36.95

SOF/SYS INC.

Executive Secretary (D)	$178.95
Executive Speller (D)	$55.95

SOFTWARE PUBLISHING CORP.

PFS: Report Sys. (D)	$71.95
PFS: Filing Sys. (D)	$94.95
PFS: Graph (D)	$94.95

STC

Apartment Manager (D)	$243.95

STONEWARE PRODUCTS

D.B. Master (D)	$174.95
D.B. Master Util. #1 (D)	$74.95
Micro Memo (D)	$28.95

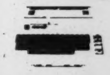
STRATEGIC SIMULATIONS

Computer Baseball (D)	$28.95
Computer Air Combat (D)	$43.95
Napoleons Campaign (D)	$43.95
Pursuit of Graft Spee (D)	$43.95

VISICORP

Visicalc 3.3 (D)	$194.95
Visifile (D)	$194.95
Visischedule (D)	$233.95
Visitrend/Plot (D)	$233.95
Visidex (D)	$194.95
Visiterm (D)	$78.95
Desktop Plan II (D)	$194.95

ATARI®



HARDWARE

800 COMPUTER (16K)	$635.00
800 COMPUTER (48K)	$724.00
400 COMPUTER (16K)	$265.00
410 PROGRAM RECORDER	$74.00
810 DISK DRIVE	$429.00
NEC 8023A-C PRINTER	$475.00
PERCOM D/D DISK DRIVE	$589.00

VIC-20
$239

AXIOM GP-100 PTR	$269.95
ENTERTAINER	$66.95
EDUCATOR	$114.95
PROGRAMMER	$52.00
COMMUNICATOR	$299.00
✱ BOOKKEEPER (KIT)	$169.95
AXIOM IMP-4 PTR	$489.95
32K RAM (INTEC)	$89.95
32K RAM (MICROTEK)	$99.95
32K RAM (MOSAIC)	$118.95
48K RAM (INTEC)	$189.95
TYPE 'N TALK	$319.00

ATARI®

SOFTWARE FOR ENTERTAINMENT AND EDUCATION

ADVENTURE INTERNATIONAL

Adventures 1, 2 & 3 (D)	$28.95
Adventures 4, 5 & 6 (D)	$28.95
Adventures 7, 8 & 9 (D)	$28.95
Adventures 10, 11 & 12 (D)	$28.95
Star Trek 3.5 (D)	$17.95
Rear Guard (D)	$17.95
Adventures 1-12 Each (C)	$14.95
Mountain Shoot (C)	$11.50
Galactic Empire (C)	$14.95
Galactic Trader (C)	$14.95

APX

Eastern Front 1941 (C/D)	$22.95
Extended Fig-Forth (C)	$29.95
Avalanche (C)	$16.95
Outlaw/Howitzer (C)	$16.95

ATARI INCORPORATED

Microsoft Basic (D)	$65.95
Macro Assem. & Editor (D)	$65.95
Assembler Editor (R)	$44.95
Basic Cartridge (R)	$44.95
Pac Man (R)	$32.95
Centipede (R)	$32.95
Caverns of Mars (D)	$28.95
Missile Command (R)	$26.95
Star Raiders (R)	$32.95
Asteroids (R)	$26.95
Conversational Lang. Ea. (C)	$43.95
Music Composer (R)	$30.95
Super Breakout (R)	$26.95
Computer Chess (R)	$26.95
My First Alphabet (D)	$25.50

AUTOMATED SIMULATIONS

Invasion Orion (C/D)	$17.95
Rescue At Rigel (C/D)	$20.95
Crush Crumble & Ch. (C/D)	$20.95
Temple of Apshai (C/D)	$28.95
Ricochet (C/D)	$14.95
Star Warrior (C/D)	$28.95
Datestones of Ryn (C/D)	$14.95
Dragon's Eye (D)	$20.95

AVALON HILL

Empire of Overmind (D)	$24.95
Dnieper River Line (D)	$20.95
Voyager (D)	$17.95
Galaxy (D)	$17.95
B-1 Nuclear Bomber (C)	$11.95
Lords of Karma (C)	$14.95
Guns of Fort Defiance (C)	$14.95
Computer Stocks & Bonds (D)	$15.95

BRODERBUND SOFTWARE

Apple Panic (D)	$20.95
Star Blazer (D)	$22.95
Track Attack (D)	$20.95
Davids Midnight Magic (D)	$24.95

EDU-WARE

Compu-Read (D)	$20.95
Compu-Math Frac. (D)	$28.95
Compu-Math Dec. (D)	$28.95

GEBELLI

Andromeda (D)	$24.95
Pathfinder (D)	$24.95
Match Racers (D)	$20.95
Dr. Goodcodes Cavern (D)	$20.95

INFOCOM

Zork I (D)	$28.95
Zork II (D)	$28.95
Deadline (D)	$35.95

IN-HOME SOFTWARE

Crypts of Terror (D)	$24.95
Alien Swarm (D)	$24.95
Intruder (D)	$24.95

LJK

Letter Perfect (D)	$108.95
Mail Merge/Utility (D)	$20.95
Data Perfect (D)	$78.95

ON-LINE

HI RES Wiz & Princess (D)	$23.95
HI RES Mission Asteroids (D)	$17.95
Crossfire (C/D)	$20.95
Mousekattack (D)	$24.95
Jawbreaker (C/D)	$20.95
Frogger (C/D)	$24.95
Threshold (D)	$28.95
Ultima I (D)	$28.95
Ultima II (D)	$43.95

QUALITY SOFTWARE

Ali Baba & 40 Thieves (D)	$23.95
QS Forth (D)	$58.95
Starbase Hyperion (D)	$16.95
Fastgammon (C)	$14.95

STRATEGIC SIMULATIONS

The Shattered Alliance (D)	$28.95
Tigers In The Snow (C/D)	$28.95
Battle of Shiloh (C/D)	$28.95

SYNAPSE SOFTWARE

Protector (C/D)	$20.95
Dodge Racer (C/D)	$20.95
Chicken (C/D)	$20.95
File Manager 800	$72.95

SYNCRO

Alien Hell (D)	$14.95
Maze of Death (D)	$14.95
Mar Tesoro (D)	$17.95

USA

3-D Supergraphics (C/D)	$28.95
Survival Adventure (C/D)	$17.95
Atari World (D)	$43.95

MISCELLANEOUS SOFTWARE

Action Quest (C/D)	$20.95
Bug Attack (C/D)	$20.95
Galactic Chase (D)	$20.95
Kayos (C/D)	$24.95
K-razy Shootout (R)	$35.95
Megalegs (C)	$24.95
Pool 1.5 (D)	$24.95
Raster Blaster (D)	$20.95
Warlocks Revenge (D)	$24.95
Visicalc (D)	$189.95

D = DISK C = CASSETTE
R = ROM (CARTRIDGE)

COSMIC COMPUTERS UNLIMITED

THE ABOVE PRICES ARE FOR PREPAID ORDERS

WRITE FOR FREE CATALOG: INDICATE APPLE OR ATARI

ORDER LINES OPEN
SEVEN DAYS 8 am - 9 pm

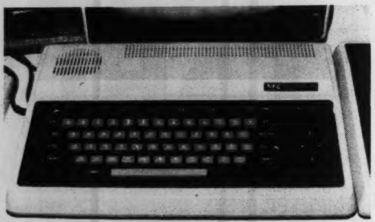
(714) 861-1265

228 N. PROSPECTORS RD.
DIAMOND BAR, CA 91765

APPLE IS A TRADEMARK OF APPLE COMPUTER, INC.
ATARI IS A TRADEMARK OF ATARI, INC.

Add $2.00 Shipping per software order. Hardware Shipping, call for cost. Calif. residents add 6½% sales tax. Cashiers Checks or Money Orders filled same day. Personal checks require 2 weeks to clear. **Master Card and Visa OK for software only, add 3% surcharge.** Include card no., expiration date and signature.

CIRCLE 148 ON READER SERVICE CARD



Utilizing NEC's Z80 microprocessor, the system contains 16K RAM and 16K ROM that are both expandable to 32K. Also featured is a version of the Microsoft Basic, with enhanced graphics and sound capabilities utilizing joysticks.

Additional peripheral equipment includes an RS-232 interface, minifloppy disk drive, data recorder for cassette-type programming, 40-character thermal printer, RAM and ROM cartridge to expand memory to 32K, and mask ROM. A 23" monochromatic monitor are also available.

Included among the entertainment software for the PC-6000 system are *Music Editor, Tennis, Othello, 3-D-Maze, High Jump,* and *Graph Generator.*

NEC Home Electronics (U.S.A.) Inc., 1401 Estes Ave., Elk Grove Village, IL 60007. (312) 228-5900.

CIRCLE 351 ON READER SERVICE CARD

SONY Business System

Sony Corporation of America announced a desktop microcomputer for business applications, the SMC-70, which is marketed through Sony's Communications Products Company.

There is a full range of peripheral devices and accessories available with the system, including an optional 16-bit adaptor unit that upgrades the SMC-70 from a Z80A system to an 8086 system. The basic unit offers 64K program/data memory, an additional 38K graphics memory and a separate 32K system memory. Also, 13 resident I/O interfaces are standard. The systems storage options begin with the 3.5" Sony micro floppy disk drives. Also available is a high density floppy disk, a 6 Mb hard disk system and a 256K cache memory device. The basic unit contains four different levels of graphics and costs $1,475.

Sony Corporation of America, 9 West 57th St., New York, NY 10019. (212) 371-5800.

CIRCLE 352 ON READER SERVICE CARD

Unix on CompuThink Hawk

CompuThink has designed the Hawk 32 as a 16/32-bit processor with a multi-user, multitasking system. The Hawk 32 is built around the MC68000 microprocessor which communicates externally with 16-bit capacity, but carries on internal communication at the 32-bit level. The Hawk 32 has a resident memory of 128 kilobytes which can be increased to one megabyte.

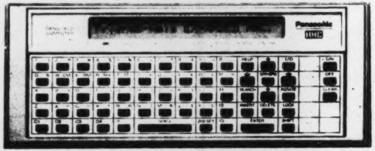
For simultaneous multi-user, multitasking applications, the Hawk 32 uses the Unix version 7 operating system developed by Bell Labs. The Hawk 32 Language library consists of 68000 Assembler, C, Pascal, Basic, Fortran 77 and ANSI 74 Cobol.

CompuThink, 965 West Maude Ave., Sunnyvale, CA 94086. (408) 245-4033.

CIRCLE 353 ON READER SERVICE CARD

Friends Amis (Panasonic) Hand-held Computer

Friends Amis, Inc. and the Matsushita Corporation have jointly created a hand-held computer based on the 6502 microprocessor with a 16K operating system in ROM. It is powered by rechargeable batteries.



The computer is expandable, when combined with the Friend Amis Datashuttle, to 40K RAM and 96K ROM. The system can be connected to a variety of portable peripherals such as 40-and 80-column printers, four-color plotters, RS-232 ports, modems, and a video adaptor with color graphics.

There are RAM modules up to 16K each. Six such modules may be connected to the system. A portable Eprom burner lets HHC system users burn their own Eproms using SnapBasic, SnapForth, and other Friends Amis languages. Up to five 16K ROM capsules may be inserted simultaneously in the expanded system.

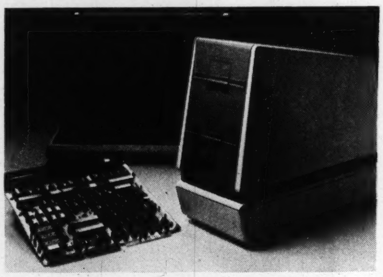
Friends Amis, Inc., 505 Beach St., San Francisco, CA 94133. (415) 928-2800.

CIRCLE 354 ON READER SERVICE CARD

CP/M Upgrade for DEC VT100

C. Itoh Electronics, Inc. introduced its own version of Digital Equipment Corporation's VT-18X upgrade kit, the CIT-188.

The CIT-188 allows both CIT-101 and DEC VT100 terminals to be upgraded to a 64K CP/M compatible, Z80 based personal computer.



The CIT-188 kit consists of a 64K Z80A based CPU board, a dual DS/DD 5 1/4" floppy disk package, and all necessary hardware, cables and installation instructions.

An optional add-on floppy disk package containing two additional 5 1/4" disk drives is available for $1925. Also offered is an optional dual-processor CPU board, including Z80A and Intel 8088 microprocessors and 128K of RAM.

Distributor: Arco Corporation, 2515 McCabe Way, Irvine, CA 92714. (714) 557-5118.

CIRCLE 355 ON READER SERVICE CARD

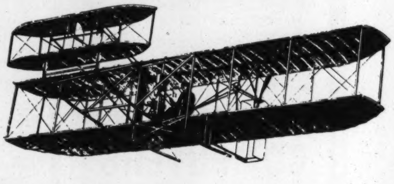
8086 MPU for Olivetti M20

Tecmar Inc. has announced an 8086 Alternate Processor for the Olivetti M20 Personal Computer. The APB 1086 board further expands the M20 by adding an 8086 microprocessor with CP/M-86 or MS-DOS to the M20's standard Z8001 processor and Olivetti PCOS operating system.

The M20 basic unit features a Zilog Z8001, 128K memory, one double density, double sided minifloppy, a 16-bit data bus and a 12" monochrome monitor. Also included as standard are five expansion slots, an RS-232C serial interface and a parallel printer interface. $2695.

Tecmar, Inc., 23600 Mercantile Rd., Cleveland, OH 44122. (216) 464-7410.

CIRCLE 356 ON READER SERVICE CARD



Pssssttt...

(Jingle Bells, Jingle Bells, Jingle All The...)

We're really not rushing the season. We wouldn't even mention it if we didn't think you'd want to know.

The **Strictly Soft Ware** Holiday Catalogs (Apple & IBM) are going to be ready early this fall. More software than ever. Same great prices. And with a customer service and technical support program that's so good that...well, let's just say someone at the North Pole is on our mailing list.

If you're already on the **Strictly Soft Ware** list, you'll automatically receive our Holiday Catalog. If you're not on the list, call us (toll-free) at 1-800-848-5263. Bulk mailing starts Oct. 1.

Don't be left out in the cold by not ordering the free **Strictly Soft Ware** Holiday Catalog. It may be the nicest present you get this year.

Holiday Gift Idea #1

*The **Strictly Soft Ware** Subscription Plan. Prepayment allows the account to be drawn upon for whatever you want, whenever you want. When we send the package, we'll provide a balance statement as well. Here's a gift that can last all year long.*

SPECIALS

Tax Man	$19.95	Kids & the Apple	$14.99
Bandits	$23.95	Ultima II	$39.99
Airsim I	$24.99	Word Handler	$159.99
P.F.S.	$89.99	Frogger	$26.99
Terrapin Logo	$119.99	Hard Hat Noah	$23.95
Visicalc	$169.99	Shelia	$19.95

IBM • SPECIALS • IBM

Write-On	$99.99	Visicalc	$189.99
Word Star	$239.99	Visidex	$189.99
Volkswriter	$159.99	Desk Top Plan	$189.99

Above Specials In Effect Until Oct. 1, 1982

Holiday Gift Idea #2

*The **Strictly Soft Ware** Gift Certificate. Here's the perfect way to take the guesswork out of holiday giving. A gift certificate and the **Strictly Soft Ware** holiday catalog guarantee the perfect gift for everyone on your holiday list.*

MasterCard

VISA

We take Master Card or VISA (include card # and expiration date). Ohio residents add 5.5% tax. Include $2.00 for postage. 3% discount if check accompanies order.

Send for free catalog. Prices subject to change. Hrs.: 9-9 weekdays; 9-6 Sat.

Strictly Soft Ware
Post Office Box 338
Granville, Ohio 43023
order by phone **800-848-5253**
in Ohio **614-587-2938**

Strictly Soft Ware

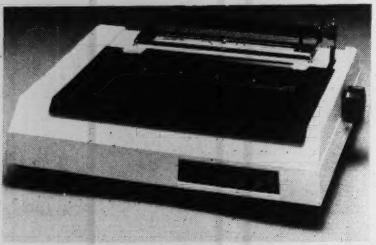
Apple is a registered trademark of Apple Computer, Inc.
IBM is a registered trademark of International Business Machines Corp.

CIRCLE 283 ON READER SERVICE CARD

PRINTERS

IDS MicroPrism Printer

The MicroPrism Printer from Integral Data Systems offers dot matrix print quality approaching that of daisy-wheel printers.



The draft mode operates at 110 cps, while correspondence quality throughout is 75 cps. High-density graphics are available in 84 x 84 dot per inch format, and all modes print in a single pass. The MicroPrism makes use of a nine-wire staggered design printhead, capable of printing nearly fully-formed characters.

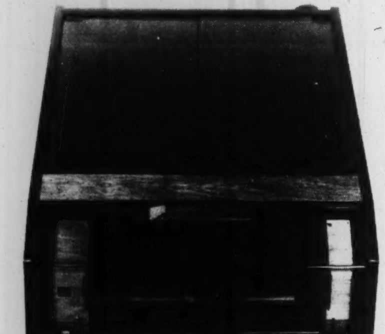
Integral Data Systems, Milford, NH 03055. (603) 673-9100.

CIRCLE 357 ON READER SERVICE CARD

Daisy Wheel/Dot Matrix Unit

Metaframe announced the Dotsy Printer Center which offers both 150 cps dot matrix and 20 cps daisy wheel printing. The dot matrix mode has a bi-directional 9 x 7 dot matrix with true descenders, and the daisy wheel mode has a bi-directional daisy wheel print element.

The print format for the dot matrix mode is 132 columns and for the daisy wheel mode is 132 columns at 10 pitch.



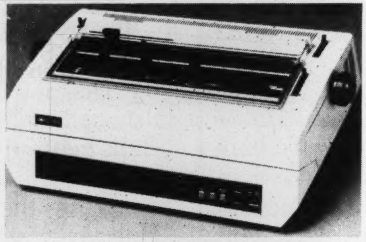
The dot matrix mode has a print speed of 150 cps and features 96 ASCII characters with upper and lower case. The daisy wheel mode has an interchangeable daisy wheel print element with over 60 type styles. Available interfaces include IBM, Apple II and III, Commodore PET, and TRS-80 I, II, and III. $1450.

Metaframe Computer Corporation, Riverside St., Nashua, NH 06301. (603) 880-3005.

CIRCLE 358 ON READER SERVICE CARD

Versatile Daisy Printer

Daisywriter 2000 is an intelligent letter-quality daisy wheel printer, from Computers International. The printer features a 16K data buffer with an optional 48K buffer available. It also features a universal interface which makes it plug-compatible with all computer systems.



Daisywriter 2000 features: automatic proportional spacing, automatic centering, subscript, superscript, true automatic margin justification, 16 protocol selections, and automatic baud rate selections.

There are 12 different type fonts available in five different languages. The printer uses standard cartridge film ribbon such as used on IBM Selectric II and III. Controls allow for selection of 10, 12, or 15 characters per inch and 1, 1-1/2, or 2 line spacing. Baud rates are DIP-switch-selectable or automatic from 50 to 19,200.

Computers International, 3540 Wilshire Blvd., Los Angeles, CA 90010. (213) 386-3111.

CIRCLE 359 ON READER SERVICE CARD

GE Heavy duty Printer

General Electric introduced the 200 Document Handler Printer, designed for high-speed, heavy duty business use. The printer has a throughput of 200 cps, but still meets ISO NR-60 acoustic noise standards. Four software or switch selectable fonts are available, as well as switch selectable six or eight lines per inch modes.

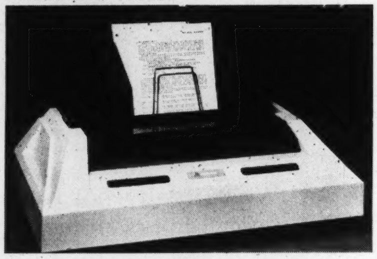
General Electric, Data Communications Products, Waynesboro, VA 22980. (703) 949-1000.

CIRCLE 360 ON READER SERVICE CARD

Two New Anadex Units

Anadex, Inc., introduced the DP-9620A printer, a member of the "Silent Scribe" line, which features acoustic noise levels below 55 dBa.

The DP-9620A is a stand-alone printer capable of alphanumerics and graphics. Alphanumeric printing speeds range from 200 cps at 10 cpi for a 7 x 9 dot matrix to 100 cps for a 13 x 9 dot matrix. The character repertoire includes the 96-character ASCII set with lower case descenders. $1025.



With multiple operational modes and speed ranges, the WP-6000 "Word Scribe" single pass printer provides letter quality, correspondence quality, draft quality, data processing and graphics printing for the office environment.

For word processing, letter quality printing of 10-pitch, 12-pitch, or proportional spacing can be produced at 150 to 180 cps. Speeds of 250 and 330 cps are obtained in a correspondence quality mode, with 10 and 12-pitch and proportional spacing. In both modes, character fonts include Serifa, Helvetica, and a complete scientific set. The price of the WP-6000 is $1825.

Anadex, Inc., 9825 De Sota Ave., Chatsworth, CA 91311. (213) 998-8010.

CIRCLE 361 ON READER SERVICE CARD

Two from Apple

The Apple Computer Accessory Products Division announced two printers, the Apple dot-matrix printer and the Apple letter quality printer, as part of the company's plan to provide dealers and customers with fully supported systems. Both printers use the features of the Apple II and the Apple III.

The Apple dot-matrix printer has high-resolution graphics output (7 x 9 dot matrix) and a bi-directional speed of 120 characters per second. The Apple letter-quality printer is a 40 cps daisy wheel printer with graphics capability. It prints bi-directionally on individual sheets or continuous forms. Multiple fonts are selected by changing daisy wheels.

Apple Computer, Inc., 10260 Bandley Dr., Cupertino, CA 95014. (408) 996-1010.

CIRCLE 362 ON READER SERVICE CARD

AARDVARK — THE ADVENTURE PLACE

ADVENTURES FOR OSI, TRS-80, TRS-80 COLOR, SINCLAIR, PET, VIC-20

ADVENTURES — Adventures are a unique form of computer game. They let you spend 30 to 70 hours exploring and conquering a world you have never seen before. There is little or no luck in Adventuring. The rewards are for creative thinking, courage, and wise gambling — not fast reflexes.

In Adventuring, the computer speaks and listens to plain English. No prior knowledge of computers, special controls, or games is required so everyone enjoys them—even people who do not like computers.

Except for Quest, itself unique among Adventure games, Adventures are non-graphic. Adventures are more like a novel than a comic book or arcade game. It is like reading a particular exciting book where you are the main character.

All of the Adventures in this ad are in Basic. They are full featured, fully plotted adventures that will take a minimum of thirty hours (in several sittings) to play.

Adventuring requires 16k on Sinclair, TRS-80, and TRS-80 Color. They require 8k on OSI and 13k on VIC-20. Sinclair requires extended BASIC.

TREK ADVENTURE by Bob Retelle — This one takes place aboard a familiar starship and is a must for trekkies. The problem is a familiar one — The ship is in a "decaying orbit" (the Captain never could learn to park!) and the engines are out (You would think that in all those years, they would have learned to build some that didn't die once a week). Your options are to start the engine, save the ship, get off the ship, or die. Good Luck.

Authors note to players — I wrote this one with a concordance in hand. It is very accurate — and a lot of fun. It was nice to wander around the ship instead of watching it on T.V.

CIRCLE WORLD by Bob Anderson — The Alien culture has built a huge world in the shape of a ring circling their sun. They left behind some strange creatures and a lot of advanced technology. Unfortunately, the world is headed for destruction and it is your job to save it before it plunges into the sun!

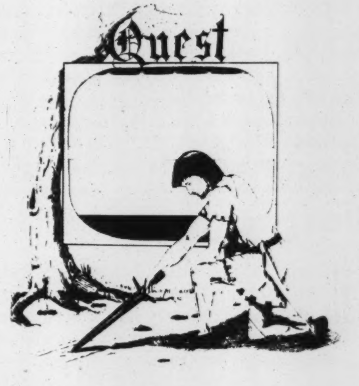
Editors note to players — In keeping with the large scale of Circle World, the author wrote a very large adventure. It has a lot of rooms and a lot of objects in them. It is a very convoluted, very complex adventure. One of our largest. Not available on OSI.

HAUNTED HOUSE by Bob Anderson — This one is for the kids. The house has ghosts, goblins, vampires and treasures — and problems designed for the 8 to 13 year old. This is a real adventure and does require some thinking and problem solving — but only for kids.

Authors note to players—This one was fun to write. The vocabulary and characters were designed for younger players and lots of things happen when they give the computer commands. This one teaches logical thought, mapping skills, and creativity while keeping their interest.

DERELICT by Rodger Olsen and Bob Anderson — For Wealth and Glory, you have to ransack a thousand year old space ship. You'll have to learn to speak their language and operate the machinery they left behind. The hardest problem of all is to live through it.

Authors note to players — This adventure is the new winner in the "Toughest Adventure at Aardvark Sweepstakes". Our most difficult problem in writing the adventure was to keep it logical and realistic. There are no irrational traps and sudden senseless deaths in Derelict. This ship was designed to be perfectly safe for its' builders. It just happens to be deadly to alien invaders like you.



NUCLEAR SUB by Bob Retelle — You start at the bottom of the ocean in a wrecked Nuclear Sub. There is literally no way to go but up. Save the ship, raise her, or get out of her before she blows or start WWIII.

Editors note to players—This was actually plotted by Rodger Olsen, Bob Retelle, and someone you don't know — Three of the nastiest minds in adventure writing. It is devious, wicked, and kills you often. The TRS-80 Color version has nice sound and special effects.

EARTHQUAKE by Bob Anderson and Rodger Olsen — A second kids adventure. You are trapped in a shopping center during an earthquake. There is a way out, but you need help. To save yourself, you have to be a hero and save others first.

Authors note to players — This one feels good. Not only is it designed for the younger set (see note on Haunted House), but it also plays nicely. Instead of killing, you have to save lives to win this one. The player must help others first if he/she is to survive — I like that.

PYRAMID by Rodger Olsen — This is one of our toughest Adventures. Average time through the Pyramid is 50 to 70 hours. The old boys who built this Pyramid did not mean for it to be ransacked by people like you.

Authors note to players — This is a very entertaining and very tough adventure. I left clues everywhere but came up with some ingenous problems. This one has captivated people so much that I get calls daily from as far away as New Zealand and France from bleary eyed people who are stuck in the Pyramid and desperate for more clues.

QUEST by Bob Retelle and Rodger Olsen — THIS IS DIFFERENT FROM ALL THE OTHER GAMES OF ADVENTURE!!!! It is played on a computer generated map of Alesia. You lead a small band of adventurers on a mission to conquer the Citadel of Moorlock. You have to build an army and then arm and feed them by combat, bargaining, exploration of ruins and temples, and outright banditry. The game takes 2 to 5 hours to play and is different each time. The TRS-80 Color version has nice visual effects and sound. Not available on OSI. This is the most popular game we have ever published.

MARS by Rodger Olsen — Your ship crashed on the Red Planet and you have to get home. You will have to explore a Martian city, repair your ship and deal with possibly hostile aliens to get home again.

Authors note to players — This is highly recommended as a first adventure. It is in no way simple—playing time normally runs from 30 to 50 hours — but it is constructed in a more "open" manner to let you try out adventuring and get used to the game before you hit the really tough problems.

ADVENTURES

ADVENTURE WRITING/DEATHSHIP by Rodger Olsen — This is a data sheet showing how we do it. It is about 14 pages of detailed instructions how to write your own adventures. It contains the entire text of Deathship. Data sheet - $3.95. NOTE: Owners of OSI, TRS-80, TRS-80 Color, and Vic 20 computers can also get Deathship on tape for an additional $5.00.

PRICE AND AVAILABILITY:

All adventures are $14.95 on tape except Earthquake and Haunted House which are $9.95. Disk versions are available on OSI and TRS-80 Color for $2.00 additional.

Please specify system on all orders

ALSO FROM AARDVARK — This is only a partial list of what we carry. We have a lot of other games (particularly for the TRS-80 Color and OSI), business programs, blank tapes and disks and hardware. Send $1.00 for our complete catalog.

AARDVARK - 80
2352 S. Commerce, Walled Lake, MI 48088
(313) 669-3110

Phone Orders Accepted 8:00 a.m. to 4:00 p.m. EST. Mon.-Fri.

TRS-80 COLOR SINCLAIR OSI VIC-20

CIRCLE 101 ON READER SERVICE CARD

NEC Dot Matrix Printer

A dot matrix printer with standard parallel interface was announced by NEC Home Electronics USA. The printer is part of the NEC PC-8000 Series Microcomputer System.

At 100 characters per second, the PC-8023A printer can bi-directionally print the PC-8001A's comprehensive set of upper and lower case ASCII, plus Greek, mathematical and graphic symbols. The unit will use either cartridge or ribbon spools.

NEC Home Electronics USA, Personal Computer Division, 1401 Estes Ave., Elk Grove Village, IL 60007. (312) 228-5900.

CIRCLE 363 ON READER SERVICE CARD

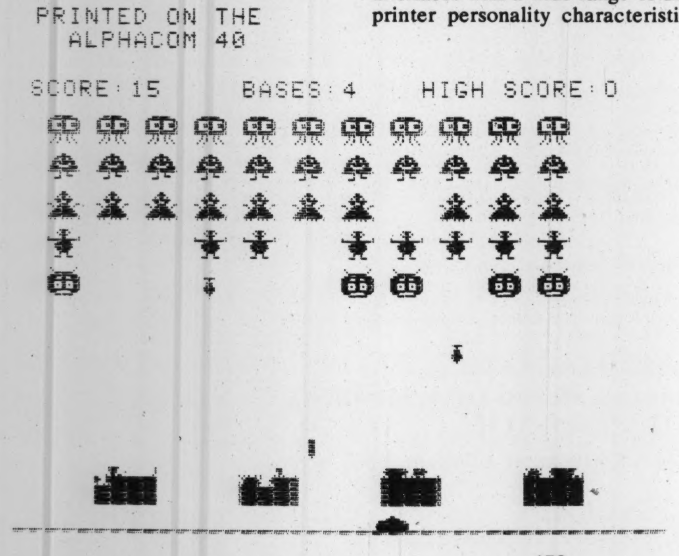
Three from Alphacom

Three new high speed dot matrix printers were announced by Alphacom. The Alphacom 20 prints 20 characters per line, at a normal print speed of 30 cps. Up to five different character sizes are available, as well as options to print sideways or upside down. Graphics mode offers 140 x n dot resolution.

The Alphacom 40 and 42 print 40 characters per line, at 160 cps for the model 40 and 80 cps for the 42. Wrap-around facility permits printing text lines longer than 40 characters. Graphics mode offers 280 x n dot resolution. The model 84 prints 80 characters per line at up to 240 cps. Graphics mode offers 660 x n dot resolution.

Alphacom, Inc., 2323 So. Bascom Ave., Campbell, CA 95008. (408) 559-8000.

CIRCLE 364 ON READER SERVICE CARD



```
PRINTED ON THE
  ALPHACOM 40

SCORE:15      BASES:4     HIGH SCORE:0
```

Epson Graftrax-Plus

Graftrax-Plus graphics capability for the Epson MX Series of printers was introduced by Epson America. Graftrax-Plus is standard in the MX Series and is also available as retrofittable PROMs. It includes 66 different type fonts.

Other features of Graftrax-Plus include programmable form length, horizontal tab and right margin, software printer reset, and true backspace. It also produces graphics with up to 120 dpi horizontally and 216 dpi vertically.

Epson America, Inc., 3415 Kashiwa St., Torrance, CA 90505. (213) 539-9140.

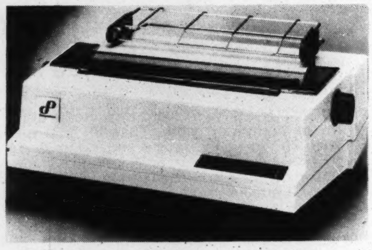
CIRCLE 365 ON READER SERVICE CARD

Dataproducts Daisy

The DP-55 is a letter-quality daisywheel printer from Dataproducts Corporation that is rated at 55 cps and offers quiet operation, superior print quality, digital status display, and printing with metal or plastic print wheels.

The DP-55 provides a horizontal resolution of 120 positions per inch with 10, 12 or 15 characters per inch, as well as proportional spacing. Vertical resolution is 48 positions per inch with six or eight lines per inch. It has 16 different printer conditions.

In addition to standard RS-232C links, interfaces with a wide range of different printer personality characteristics are available, including such options as Qume, Diablo, and Centronics protocols. Expandable memory up to 12K programmable ROM and from 1K to 3K RAM offers users the ability to customize operating parameters. The DP-55(RO) is $1400.

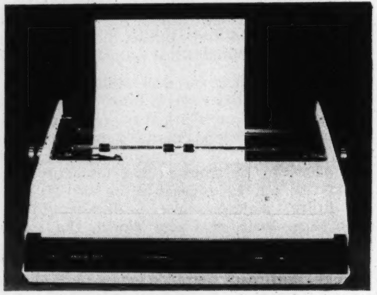


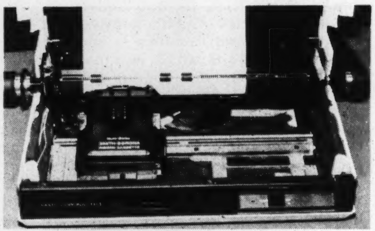
Dataproducts Corporation, 6200 Canoga Ave., Woodland Hills, CA 91365, (213) 887-8451.

CIRCLE 366 ON READER SERVICE CARD

Economical SCM Daisy

SCM announced the TP-1 daisy-wheel printer, bringing the cost of true letter quality to a price affordable to individuals and small businesses. The TP-1 prints unidirectionally at 12 cps. For this sacrifice in speed, it offers high quality print.





Interchangeable daisy wheels are available in 10 and 12 pitch versions.

Smith-Corona, Consumer Products Division, 65 Locust Ave., New Canaan, CT 06840. (203) 972-1471.

CIRCLE 367 ON READER SERVICE CARD

Toshiba Dot Matrix

Toshiba announced the P1350 Letter-Perfect dot matrix printer, offering a draft quality mode of 160 cps, and a letter

NEECO

commodore
CBM

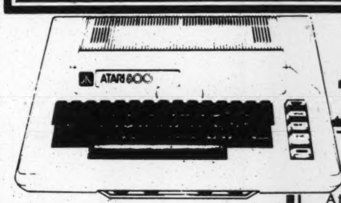
Commodore Computer

VIC 20 Personal Computer	$ 299.95
VIC 1515 Graphic Printer	$ 395.00
CBM 4016	$ 995.00
CBM 4032	$1295.00
CBM 8032	$1495.00
CBM SuperPet 9000	$1995.00
CBM 8050 Dual Disk Drive	$1795.00
CBM 4040 Dual Disk Drive	$1295.00
CBM 2031 Single Disk Drive	$ 695.00
CBM 4022 Tractor Printer	$ 795.00
CBM 8010 IEEE Modem	$ 279.00
CBM Datasette	$ 74.95
CBM-IEEE Interface Cable	$ 39.95
IEEE-IEEE Interface Cable	$ 49.95

Professional Software/for CBM Computers

WordPro™ — a Family of CBM Word Processing Programs

WordPro 2 Plus	$ 199.95
WordPro 3 Plus	$ 295.00
WordPro 4 Plus	$ 450.00
WordPro 5 Plus (for CBM 8096)	$ 450.00
The Administrator (DataBase for CBM)	$ 650.00
Power™ (Programmer's Utility ROM)	$ 89.95
InfoPro™ (DataBase for CBM)	$ 295.00



Atari

Atari 400 16K	$ 299.00
Atari 800 16K (incl. BASIC cartridge)	$ 899.00
Atari 410 Recorder	$ 99.95
Atari 810 Disk Drive	$ 599.95
Atari 822 Thermal Printer	$ 299.95

Amdek Monitors

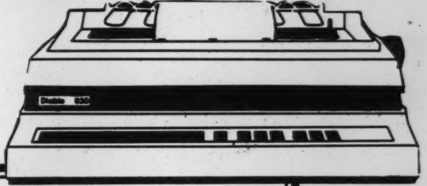
Video 100G (Limited Quantity)	$ 119.00
Video 300G	$ 185.00
Color 1	$ 425.00
Color 2	$ 899.00

CMD Mupet

MC-800A Mupet Controller (Multi-User Controller for CBM Computers)	$ 995.00
CM-100 Channel Module	$ 250.00
Printer Module	$ 350.00

Qume

Sprint 9/45	$2495.00
Tractor Option	$ 210.00



Epson Printers

MX-70	$ 299.95
MX-80 w/Graphtrax	$ 645.00
MX-80 FT	$ 745.00
MX-100 FT	$ 945.00
INTERFACE CARDS	
8141 RS-232 Interface Board	$ 75.00
8145 RS-232 Interface Board w/2K Buffer	$ 149.00
8151 RS-232 Interface Board w/X/ON-X/OFF	$ 170.00
8161 IEEE Interface Board	$ 55.00
8131 Apple Interface Card	$ 85.00
8232 Apple Interface Cable	$ 35.00
8220 TRS-80 Cable	$ 35.00

Diablo 630 Printer

Diablo 630	$2710.00
Tractor Option	$ 350.00

NEC Spinwriter Printer

NEC 7730	$3085.00
NEC 7710	$3085.00
NEC 7720	$3610.00
NEC 3510	$2290.00
NEC 3500RD	$1895.00

Tractor Feed Options are available

***WordPro, POWER, & InfoPro are registered trademarks of Professional Software Inc.**

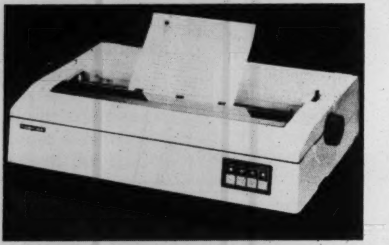
CALL FOR OUR 70 PAGE CATALOG FOR COMPLETE PRODUCT LINE AND PRICE LISTINGS.
WE WILL MATCH SOME ADVERTISED PRICES ON CERTAIN PRODUCTS LISTED UNDER SIMILAR "IN STOCK" CONDITIONS.

NEECO
679 Highland Ave.
Needham, MA 02194

(617) 449-1760
TELEX: 951021

MON-FRI 9:00 - 5:30 E.S.T.
MASTERCARD * UISA

CIRCLE 226 ON READER SERVICE CARD



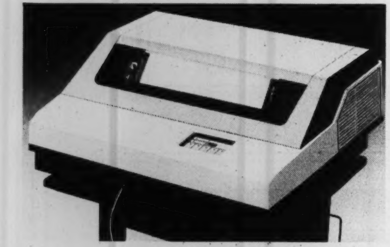
quality mode at 100 cps. Modes are software selectable. The print head is a 24 pin, overlapping design, capable of producing high quality dot matrix text, as well as graphics. The P1350 accepts friction, pin, or tractor feed paper, as well as offering an optional automatic sheet feeder. Paper may be 5" to 15" wide.

Toshiba America, Inc., Information Systems Division, 2441 Michelle Dr., Tustin, CA 92680. (714) 730-5000.

CIRCLE 368 ON READER SERVICE CARD

High-speed Compact Unit

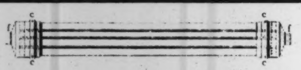
The C. Itoh Citizen 300 Line Printer, a desktop-size, variable speed dot matrix line printer designed for sophisticated printing capabilities in distributed data processing and minicomputer system applications, was introduced by C. Itoh Electronics, Inc.



It features print speeds of 72-300 lines per minute, and allows users to generate near letter quality correspondence, data processing reports and tables, and high resolution graphics for bar codes, OCR, labels, charts, forms generation and multipart formsets. The 300 Line Printer includes dual microprocessors with RAM and ROM for character selection and generation, three boards and a two-digit alphanumeric fault identification display. The C. Itoh Citizen 300 printer is priced under $5000.

C. Itoh Electronics, Inc., 5301 Beethoven St., Los Angeles, CA 90066. (213) 306-6700.

CIRCLE 369 ON READER SERVICE CARD



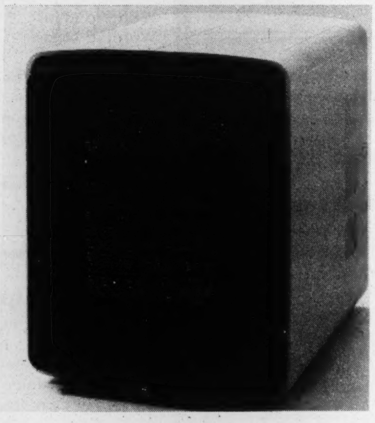
DISPLAYS

8 1/2 x 11 Page Display

Micro Display Systems announced The Genius full page display terminal for mini and microcomputers. The Genius displays 57 lines (73 optional) of 80 characters, or a full 8 1/2" x 11" page. Each character is composed of dots in a 7 x 12 format within a 9 x 14 field, giving outstanding resolution.

A raster video generator is located in an enclosure with the CRT and a separate power supply. An interface card plugs into an Apple II slot. The video generator has its own 8K memory so no load is presented to the Apple CPU for refresh.

WordStar software is available for The Genius. In addition, it can emulate other 80-column cards.



Also announced were three compatible interfaces for The Genius full page display CRT: the RS-232, S-100 and Apple III versions.

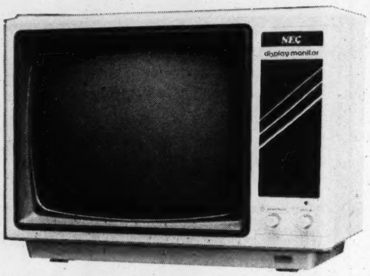
The Genius is compatible with SoftCard WordStar, and other CP/M based software programs. The 36 lb. display has an 87 MHz bandwidth and 8K high-speed buffer memory. An Apple II interface card is standard with The Genius, which costs $1795. RS-232, S-100 or Apple III interfaces may be selected at no additional charge.

Micro Display Systems, Inc., 1310 Vermillion St., P.O. Box 455, Hastings, MN 55033. (612) 437-2233.

CIRCLE 370 ON READER SERVICE CARD

Neat NEC Monitor

A 12" green phosphor monitor was announced by NEC Home Electronics. The JB-120M has 600-line resolution and display stability during power supply fluctuations. Input is via a standard RCA jack.



NEC Home Electronics (U.S.A.) Inc., 1401 Estes Ave., Elk Grove Village, IL 60007. (312) 228-5900.

CIRCLE 371 ON READER SERVICE CARD

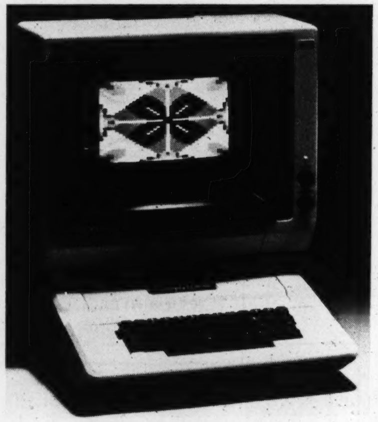
Amdek RGB Monitors

Designed with RGB video input and using a commercial grade CRT, the portable 13" Color III professional monitor from Amdek Corporation provides high-plus resolution graphics display for Apple III and Apple II computers. The Amdek Color III Monitor features 26 x 300 line resolution and 80 x 24 character display capability.

To allow the Apple II and III to be used with an RGB monitor, Amdek has an interface called Digital Video Multiplexor. The Color III retails at $569.

The Digital Video Multiplexor (DVM) is an interface for Apple II personal computers that obtains high resolution color graphics and an 80 x 24 character display. The DVM is basically a four-channel multiplexor—three color channels (under software control) for low and high resolution images and a fourth channel which allows use of an 80-character video board. $199.

A low cost Digital Video Multiplexor for interfacing the Apple II computer to an RGB color monitor for high resolution graphics and 80 x 24 text display was also introduced by Amdek. The Combo-DVM is software color-channel programmable, permitting computer control of the RGB



IMAGINE IT...
NEW
NOW WITH
DUAL HI-RES
GRAPHICS
CAPTURE IT.

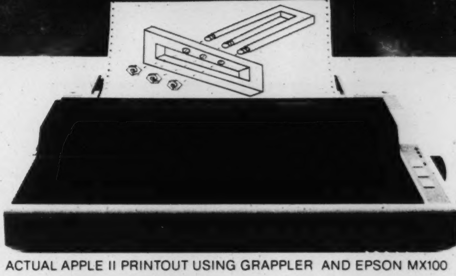
Completely Redesigned.
Now, the Grappler+.
The original Grappler was the first graphics interface to give you hi-res screen dumps from your keyboard. The new Grappler+ with *Dual Hi-Res Graphics* adds flexibility with a side-by-side printout of page 1 and page 2 graphics.

Interfacing the Grappler+ to a wide range of printers is easy as changing a dip switch. 4K of exclusive firmware makes the Grappler+ the most intelligent, full-featured Apple® Printer Interface made. And, the Grappler+ is Apple III compatible.*

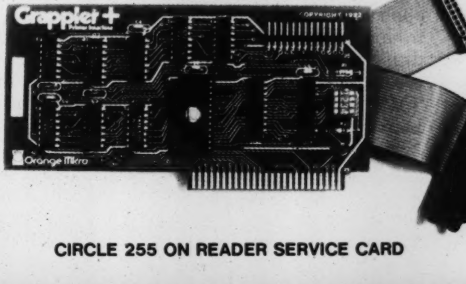
The imitations are many, so insist on the #1 Apple Graphics Interface on the market. Insist on the Grappler+. Available now at most Apple dealers.

*Requires additional software driver.
**Requires graphics upgrade.

©Orange Micro, Inc. 1982


ACTUAL APPLE II PRINTOUT USING GRAPPLER AND EPSON MX100

With The Grappler+™ Printer Interface



CIRCLE 255 ON READER SERVICE CARD

The Grappler+ Features:
• Dual Hi-Res Graphics • Printer Selector Dip Switch • Apple III Compatible* • Graphics Screen Dump • Inverse Graphics • Emphasized Graphics • Double Size Picture • 90° Rotation • Center Graphics • Chart Recorder Mode • Block Graphics • Bell Control • Skip-over-perf • Left and Right Margins • Variable Line Length • Text Screen Dumps.

The Grappler+ works with Pascal and CPM.

The Grappler+ Interfaces with the following printers:
• Anadex • Centronics • Datasouth • Epson** • IDS • NEC • C-Itoh • Okidata**

Orange Micro Inc.
3150 E. La Palma, Suite G
Anaheim, California 92806
(714) 630-3620

CPM is a registered trademark of Digital Research, Inc.
Apple is a registered trademark of Apple Computer, Inc.

Foreign Dealer Inquiries Welcome TX183511 CSMA inputs. Four computer-controlled, multiplexed video channels include: Apple II 40 character line text, Apple II low resolution color graphics, Apple II high resolution color graphics, 80 character line text from a vendor board such as the Videx Video term, or the Advance Logic's Smart term.

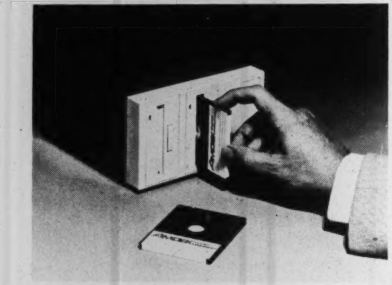
Amdek Corporation, 2420 E. Oakton St., Suite E, Arlington Heights, IL 60005. (312) 364-1180.

CIRCLE 372 ON READER SERVICE CARD

DISK DRIVES

Amdek 3" Microfloppy

A 3" Micro-Floppydisk dual disk drive, introduced by Amdek Corporation, offers 1 megabyte capacity and is plug compatible with standard 5" floppy disk drives. The drive has a built-in power supply and accomodates two 3" Micro-Floppydisk cartridges. The approximately 3" x 4" cartridge has a hinged cover to protect the disk.



The single-side recording capacity is 125K bytes or 250K bytes for both sides with double density (500K byte) capability. $899.

Amdek Corporation, Marketing Dept., 2420 E. Oakton St., Suite E, Arlington Heights, IL 60005. (312) 364-1180.

CIRCLE 373 ON READER SERVICE CARD

Lobo CP/M, IBM Drives

Lobo Drives International has a full line of disk drives which support CP/M on the NEC PC-8000 computer system. Lobo software enhancements support the standard NEC PC-8031A Mini-Disk Unit; Lobo 8", single or double sided, double density floppy systems; and Lobo 5 1/4" or 8" hard disk systems.

All of these drive types can be on line at once; the simple hardware set up and software start up procedures allow the user to designate the boot drive. When a Lobo dual drive 8" floppy system is in use, the Lobo floppy is able to write in either single or double density format, thus allowing compatibility with standard CP/M systems and package CP/M software.

Lobo also announced high capacity add-on 8" floppy disk systems for the IBM Personal Computer. The Lobo add-on system can be configured with the user's choice of two or four 8" drives, each of which may be single or double sided. With 630 kilobytes per side (double density format), a system of four double sided drives makes available over 5 megabytes of on-line storage. Connection to the computer is made via a Lobo interface board. A minimum system with two single sided drives is $1625. A maximum of four double-sided drives is $3774.

Lobo also offers a 60K compatible version of the CP/M support software for the Apple II. These BIOS modifications are upward compatible with existing Lobo CP/M support and are usable with either the 56K or 60K versions of Microsoft CP/M. Both versions require a Microsoft SoftCard and 16K RAM card. Dual 8" floppy systems are available in single or double sided models and come with the LCA-22 controller interface which can be plugged into either slot 5 or 7. The Lobo software allows these floppy drives to read and write in double density format. Model 950A is $3663, Model 1850A is $4459, Model 5202CA is $2025, and Model 8202CA is $1625.

The Pack allows eight personal computers to share a single Winchester disk. The Pack is a compact hardware multiplexor which attaches to any Lobo Winchester disk unit, and contains interfaces for up to eight computers (any combination of Radio Shack TRS-80 Model I or III, and/or Lobo's new Max-80).

Lobo Drives International, 358 S. Fairview Ave., Goleta, CA 93117. (805) 683-1576.

CIRCLE 374 ON READER SERVICE CARD

Axlon Atari Add-ons

The Axlon RAMdisk 320K Memory System, developed by Axlon Inc., is for the Apple II. Offering 320K bytes of RAM memory, the system functions like two 35-track floppy disk drives. It is compatible with Apple DOS 3.3 and Apple Pascal 1.1, and the CP/M and Flex operating systems.

The Axlon RAMdisk 320K Memory System includes software for diagnostics, fast load and copy routines, and business applications. The system draws no power from the Apple, has memory refresh when the Apple is off, and has a built-in rechargeable battery (good for 3 hours).

RAMDISK320
AXLON

Axlon also announced the Atari 800 users' modification called the RAMcram 32K Memory Module. The RAMcram can be used with Axlon's RAMdisk 128K Memory System. Together, RAMcram and RAMdisk provide a total of 160K RAM memory while leaving the third RAM slot open for future expansion.

When the RAMdisk is used as an additional disk device in conjunction with the Atari 810 disk drive, it is compatible with software using Atari DOS 2.OS. The RAMdisk 128K Memory System includes the 128K RAMdisk module, operating manual, Memory Management Software and utility software.

Axlon Inc., 170 N. Wolfe Rd., Sunnyvale, CA 94086. (408) 730-0216.

CIRCLE 375 ON READER SERVICE CARD

SONY 3.5" Microfloppy

Sony Corporation was showing their 3.5 micro floppy disk system. Sony's micro floppy disk is 3.5" in diameter and can record 437.5K bytes of information (unformatted) on one side, a density much higher than existing systems. The disks are housed in rigid plastic cases which provide good protection from dust and dirt.

Sony Corporation of America, Corporate Communications Department, 9 West 57th St., New York, NY 10019. (212) 371-5800.

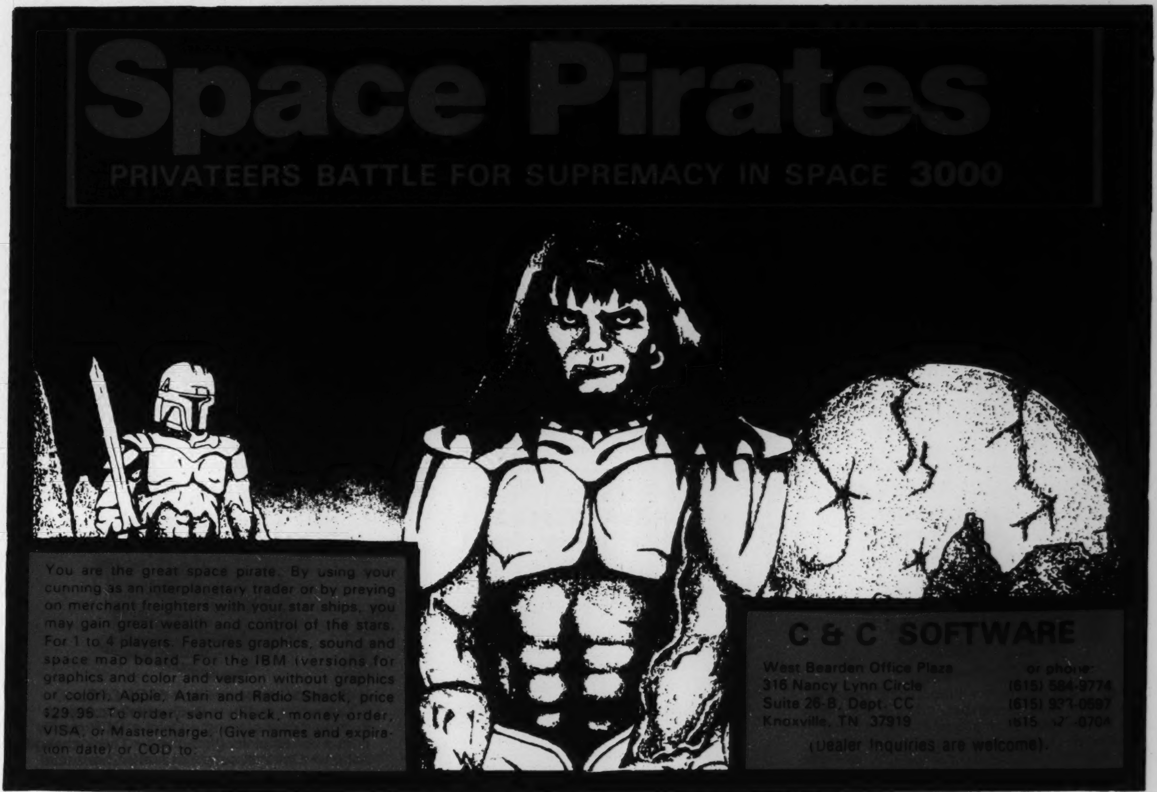
CIRCLE 376 ON READER SERVICE CARD

Trak Expandable Drives

MEC (Modular, Expandable, Compact) is a new approach to packaged disk drive systems for desktop computers developed by Trak Microcomputer Corporation.

MEC floppy master modules include a single trimline Trak drive, built-in diskette storage compartment and a fan-cooled dual drive power supply. Trak's floppy MEC systems are compatible with standard Trak 5 1/2" and 8" drives for Apple, IBM, TRS-80, Heath/Zenith, S-100 and other micros and minis.

Trak also has a line of 5 1/4" Winchester based MEC systems with a total of 14 models offered including master modules with single hard disks, intelligent controllers and host computer adapters, hard disks or floppy disk back-ups, expansion hard disk or floppy disk modules and add-on modules without controllers and



Space Pirates

PRIVATEERS BATTLE FOR SUPREMACY IN SPACE 3000

You are the great space pirate. By using your cunning as an interplanetary trader or by preying on merchant freighters with your star ships, you may gain great wealth and control of the stars. For 1 to 4 players. Features graphics, sound and space map board. For the IBM (versions for graphics and color and version without graphics or color), Apple, Atari and Radio Shack, price $29.95. To order, send check, money order, VISA, or Mastercharge. (Give names and expiration date) or COD to:

C & C SOFTWARE

West Bearden Office Plaza
316 Nancy Lynn Circle
Suite 26-B, Dept. CC
Knoxville, TN 37919

or phone:
(615) 584-9774
(615) 933-0597
(615 [illegible]-0704

(Dealer Inquiries are welcome).

CIRCLE 124 ON READER SERVICE CARD

Introducing the SERIES 900

MARKET MAVERICK

A new stock market program from FSI for the serious investor

Used with the Apple II,* the Series 900 "Market Maverick" provides immediate investment counsel and is not just another device that raises more questions than it answers. Utilizing shorter forecast time horizons, Series 900 has a long history of excellent performance even under extreme market conditions. With fewer inputs, it is user friendly—yet it answers questions asked from many angles and points of view. Series 900 "Market Maverick" is not a game. It is not theoretical. It is for the serious investor or stock broker. Send for yours today. ***Requires 48K Apple II/II Plus, DOS 3.3 and Applesoft in ROM or 16K RAM expansion.***

Save $30...Limited Time Offer. If you order now, we will ship your Series 900 "Market Maverick" for just $145.00—and that's $30.00 off the regular price! MasterCard/Visa welcome, as are dealer inquiries.

- * Over 10 years of excellent performance
- * Stock data provided for immediate use on over 900 stocks
- * Logic is based on precisely-read variables
- * Fantastic results in up or down markets

SAVE $30 **FREE BROCHURE**

☐ Please send me the Series 900 Market Maverick for just $145.00. (Ohio residents add 5% sales tax)

☐ Please send me the free brochure which contains additional specific information on the "Market Maverick."

Paid by: ☐ Check to Financial Software, Inc.
☐ MasterCard ☐ Visa
Card#________________ Exp.____________

Name ____________________________
Address____________________________
City ________________ State______Zip________

FINANCIAL SOFTWARE, INC.
11401 Westridge Circle, Chardon, OH 44024 / (216) 338-6811

INTRODUCTORY
PRICE
$145.00
SAVE $30

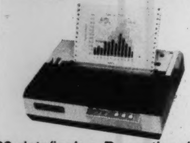
*Apple II is a registered trademark of Apple Computer, Inc.

OUR PRICES, SELECTION AND SAME-DAY SHIPPING MAKE US COMPETITIVE.

Red Baron. Home of the Nation's

NEC 8023

Outstanding Graphics, Print Quality & Performance

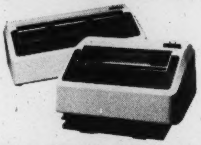


144 x 160 dots/inch • Proportional Spacing • Lower case descenders • N x 9 dot matrix • 8 character sizes • 5 unique alphabets • Greek character set • Graphic symbols • 100 CPS print speed • Bi-directional logic-seeking • Adjustable tractors • Single-sheet friction feed • Vertical & horizontal tabbing

NEC 8023
Dot Matrix .... List $795 **$Call**

IDS Paper Tiger

Prism 80/132
Affordable Color, Speed

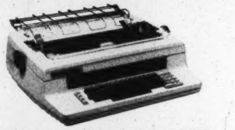


Dot Resolution Graphics • 9-wire staggered printhead • Lowercase decenders • Over 150 CPS • Bi-directional, logic-seeking • 8 character sizes • 80-132 columns • Proportional spacing • Optional Color • Text justifications

Prism 80 .... Base List $999
Prism 132 (Color) Base List $1,299 **$Call**

NEC Spinwriter

7700 & 3500
Daisy Wheel Quality Leader



High speed, letter quality • 55/35 CPS • Typewriter quality • Bi-directional printing & proportional spacing • Quiet • OCR quality print • Hi-res plotting/graphing • Quick change ribbon • Optional cut-sheet feeder, horizontal or bidirectional tractors • Prints up to 8 copies.

NEC Spinwriter RO
Serial Parallel 77xx .... List $3055 **$2575**
35xx .... List $2290 **$1900**

Smith Corona TP-1

Daisy Wheel Printer For Under $900

Letter quality • Standard serial or parallel data interface • Drop-in ribbon • 144 WPM • Various fonts available • Loads paper like typewriter • Handles single sheets for forms

Smith Corona TP-1 ..... List $895 **$Call**

The Epson Series

High-Quality Printers at a Low Price.

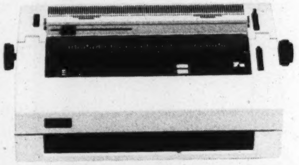
FREE
GRAFTRAX
PLUS

Epson MX80 .... List $645
Epson MX80FT ...... List $745 **$Call**
Epson MX-100 .... List $995

Full Line of Epson Accessories

Brothers HR-1 Daisy Wheel

Perfect for quality, quiet word processing.



• 16 CPS • Prints up to 6 copies • Bidirectional • Cloth or carbon quick-change cassette ribbon • Quiet, efficient operation for word processing •

Brothers HR-1 (Parallel) List $1,100
Brothers HR-1 (Serial). . List $1,200 **$Call**

Anadex Silent Scribe

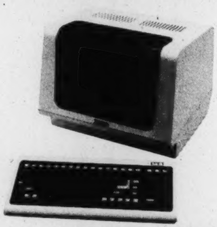
The Quiet Serial Matrix Impact Printer

Up to 200 CPS • Dot addressable graphics • Parallel and serial interfaces standard • Switch selectable protocol • Cartridge ribbon • Foreign character sets • Underlining • 1.5K to 3.5K buffer • Correspondence quality print

Anadex DP-9500A..... List $1,725
Anadex DP-9620A..... List $1,845 **$Call**
Anadex DP-6000...... List $3,250

Televideo CRT's

Price, Performance & Reliability



910 .... List $699
925 .... List $995
950 .... List $1195

$Call For low Prices

Interface Equipment

Complete Stock of Options, Cables and Accessories.

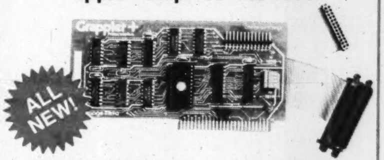
CCS APPLE SERIAL Interface & Cable .	$150
ORANGE INTERFACE for Apple II Parallel Interface Board & Cable	$90
NOVATION CAT Acoustic Coupler......	$175
NOVATION D-CAT direct connect modem	$180
COMPLETE STOCK OF EPSON ACCESSORIES	$Call
CUSTOM PRINTER CABLES FOR Apple, Atari, IBM, TRS-80 (all models)	$Call
HAYES MICROMODEM	$300
PRINTER STANDS: Large	$99
Small	$25
PRINTER RIBBONS—Most Types	$Call

OUR PEOPLE MAKE US EXPERTS.

Largest Computer Printer Inventory.

The Grappler+™

Apple® Graphics Interface



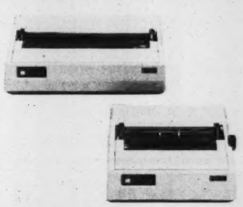
• Graphic and text screen dumps • Dual Hi-Res Graphics • Printer Selector Dip Switch • Apple III compatible* • Inverse Graphics • Emphasized Graphics • Double Size Picture 90° Rotation • Center Graphics • Works with Pascal and CPM® • No software needed

Grappler+ $175

*Requires software driver
Apple is a registered Trademark of Apple, Inc.

The Okidata Series

Hi-Res or TRS 80 Block Graphics



120 CPS • 9 × 9 Matrix • Bidirectional logic seeking printing • Lower case descenders • four print styles • Optional Hi-Res Graphics

Okadata 82A . . . . List $649
Okadata 83A (w/Tractor) . . List $995 $Call

IDS Microprism 480

Prints like a daisy, priced like a matrix!

• Correspondence Quality in a Single Pass • Dual Speed 75, 110cps • Proportional Spacing • Bidirectional Logic Seeking Head • Platen pin or pressure feed • 24x9 dot matrix • 10, 12, 16.8 Characters per inch • Double width Characters

IDS Microprism 480 . . . List $799 $Call

Our People, Our Product: Both Are Specialized.

Because our salespeople are printer specialists, they know the capabilities of each printer—and how to match one to your exact need. Red Baron's volume stocking assures a low, low price on a wide array of major brands. We're sure you'll like the product and services you get from Red Baron, and we know you'll love our Customer Benefit Package; an exclusive at Red Baron.

Customer Benefit Package

1. Free Expert Consultation. Before you buy, after you buy. 2. Technical Staff. Even your most involved questions get quick, helpful answers from our staff of printer technicians. 3. Free Catalog. Get your informative catalog with printer comparison chart and print samples today! 4. Warranty. The manufacturer's warranty applies where applicable. 5. Same-Day Shipping. Your order is shipped the same day when you call before 11:00 a.m. 6. Free MasterCard and Visa. Call us toll-free and charge your printer to your credit card. 7. We Stock What We Sell. No bait and switch, no hassle. We make every effort to keep a large stock of our advertised products. 8. APO/FPO Orders Welcome.

Other Quality Printers at Red Baron

C. Itoh 8510 Prowriter	$795	$Call
C. Itoh F-10	$1995	$Call
Diablo 630/6	$2995	$2570

Here's How To Order:

Phone orders are welcome; same-day shipment on orders placed before 11:00 a.m. Free use of MasterCard and Visa. COD's accepted. Personal checks require 2 weeks clearance. Manufacturer's warranty included on all equipment. Prices subject to revision.

Call Toll Free For Catalog:

(800) 854-8275

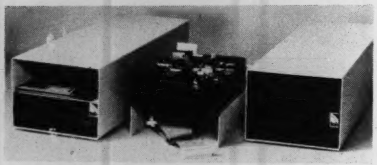
CA, AK, HI (714) 630-3322

MasterCard VISA

Red Baron
COMPUTER PRODUCTS

1100 N. TUSTIN #207, ANAHEIM, CA 92807
CIRCLE 256 ON READER SERVICE CARD

© Red Baron Computer Products, 1982



adapters. Trak MEC hard disk systems are available for the Apple II, IBM, TRS-80, NEC, Heath/Zenith, S-100 bus, LSI-II and other minis and micros. Representative prices are $429 for a MEC 5 1/4" 40-track single sided drive and $325 for an additional drive. An 8" 77-track double sided drive system sells for $1189; a two-drive system for $2129.

Trak Microcomputer Corporation, 1511 Ogden Ave., Downers Grove, IL 60515. (312) 968-1716.

CIRCLE 377 ON READER SERVICE CARD

IBM Shared Winchester

Tecmar Incorporated announced shared Winchester capability for the IBM Personal Computer. This Shared Disk Facility allows up to four IBM Personal Computers to share a single PC-Mate Winchester disk. It features a 5 or 10 megabyte shared disk, two to four IBM Personal Computers sharing one disk, CP/M-86 and PC-DOS support, and file level lockout. It comes with backup and copy utilities. The suggested retail price for a 5 megabyte shared Winchester $2995, the 10 megabyte version is $3995.

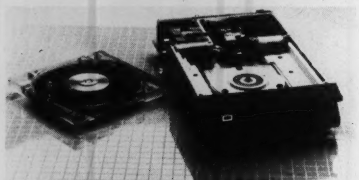
Tecmar, Inc., 23600 Mercantile Rd., Cleveland, OH 44122. (216) 464-7410.

CIRCLE 378 ON READER SERVICE CARD

3.9" Winchester Cartridge

SyQuest Technology has announced the SQ306, a 3.9" removable cartridge Winchester disk drive which provides 6.38 megabytes of mass storage.

The SyQuest SQ306 is compatible with the Seagate Technology ST506/406 5.25" fixed disk Winchester drive. With identical storage capacities (6.38 megabytes unformatted/5 megabytes formatted), performance and data transfer specifications, track and sector formats, and control interfaces, the SyQuest SQ306 can utilize the controller interfaces designed for ST506/406, such as the DTC 510A, XEBEX 1410 and Western Digital WD 1000. 400. The digital closed-loop embedded servo control design. DigiLok, extends the SQ306 metal band positioner to 100 micro inches.



SyQuest Technology, 44160 Warm Springs Blvd., Fremont, CA 94538. (415) 490-7511.

CIRCLE 379 ON READER SERVICE CARD

UP Winchester Drive

United Peripherals announced the UP-9705 hard disk system. The UP-9705 has 5 megabytes of data storage, which is the equivalent of four double sided, double density 8" floppy disk drives. The UP-9705 contains a single 5 1/4" Winchester drive, a power supply, and a Xebec S1410 single-board controller that features an SASI interface, error detection and correction, multi-sector transfers, and data buffer. It is directly compatible with Apple, IBM and other small computers.

United Peripherals, 432 Lakeside Dr., Sunnyvale, CA 94086. (408) 730-4440.

CIRCLE 380 ON READER SERVICE CARD

MISC. HARDWARE

Datalink Terminal

Axlon Incorporated released Datalink Series 1000, a portable Communication Terminal for multiple markets. It can be used to transmit and retrieve information from databases.

The Datalink has rechargeable batteries and built-in direct connect modem. It measures 1 5/8" x 3 9/16" x 6 3/4" Character speeds of 110 and 300 baud are available through a keyboard selection.

AXLON DATALINK
AXLON

Datalink can use output devices such as RS-232 serial printers and personal computer systems with communications modems. Optional output devices for the Datalink include a 40 character-per-line printer, and a television video display interface. $400.

Axlon Inc., 170 N. Wolfe Rd., Sunnyvale, CA 94086. (408) 730-0216.

CIRCLE 381 ON READER SERVICE CARD

Printer Buffer for Apple

Practical Peripherals introduced Microbuffer, a device designed to allow microcomputers to continue processing while printing takes place. Microbuffer models have been designed to fit virtually all microcomputers and printers.

Text is spooled to the memory of Microbuffer , which in some models can be expanded from a minimum of 16K to 256K. The printer is then driven by Microbuffer, freeing the computer for other use.

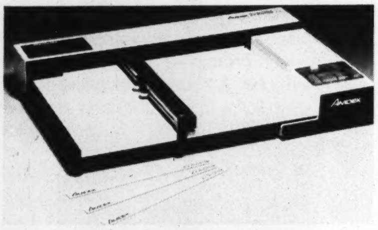
Microbuffer is available for inboard installation in the Apple II, in parallel or serial versions. It is also available in models designed specifically for Epson printers, as well as "in-line" design to fit other micro/printer or micro/modem combinations.

Practical Peripherals, Inc., 31245 La Baya Dr., Westlake Village, CA 91362. (213) 991-8200.

CIRCLE 382 ON READER SERVICE CARD

Amdek 4-Color Plotter

The Model DXY four-color Plotter was introduced by Amdek Corporation. It has a 10" x 14" effective plotting range, and allows figures to be drawn using the Control Command or Basic Command. Its functions may be expanded by adding additional ROM.



Maximum plotting speed is 2.73" per second and step size is .003"/step. A Centronics interface is furnished. $949.

Amdek Corp., Marketing Dept., 2420 E. Oakton St., Suite E, Arlington Heights, IL 60005. (312) 364-1180.

CIRCLE 383 ON READER SERVICE CARD

SOFTWARE

Apple Software

Apple Computer, Inc. announced *Quick File III*, a filing system for managing small to medium size collections of information on the Apple III. Quick File III arranges records in alphabetical, numeric, date, or time order. The program requires an Apple III system with at least

HUNTINGTON COMPUTING

NEW ITEMS

#8800	Adam & Eve Paddles (Tech Designs)	**$33.89**
#3259	Apple Mechanic (Beagle Bros.)	**$24.99**
#8660	Assembler Teacher (Compu Works)	**$38.19**
#1077	Bandits (Sirius)	**$29.69**
#3109	Business Bookkeeping System (Dakin 5)	**$335.69**
#1118	Cannonball Blitz (On-Line)	**$29.69**
#1457	Firebug (Muse)	**$21.19**
#2563	First Class Mail (Continental)	**$63.69**
#745	Firmware Rom (Novation)	**$24.59**
#8207	Format Rom (Soft Control)	**$42.39**
#1456	Frazzle (Muse)	**$21.19**
#1207	Global Program Line Editor (Synergis)	**$55.19**
#4403	Gold Rush (Sentient)	**$29.69**
#8002	Graftrax Plus (Epson)	**$60.00**
#1409	Graphics Combo Pkg. (Sublogic)	**$101.79**
#1078	Jellyfish (Sirius)	**$25.39**
#1079	Kabul Spy (Sirius)	**$29.69**
#1148	Lafpak (On-Line)	**$29.69**
#703	The Manager (Omega)	**$29.69**
#1111	Mouskattack (On-Line)	**$35.09**
#3302	P F S: Graph (Software)	**$106.19**
#7558	Personal Finance Master (Spectrum)	**$63.69**
#1018	Pursuit of Graf Spee (Strategic Sim.)	**$50.89**
#1164	Pie Writer - Multi (Hayden)	**$127.39**
#1163	Pie Writer - Standard (Hayden)	**$127.39**
#9487	The Programmer (Advanced Operating)	**$420.69**
#224	Pseudo Disk - Pascal (Saturn Sys.)	**$33.09**
#2183	Queen of Phobos (Phoenix)	**$29.69**
#221	64K Ramboard (Saturn Systems)	**$361.00**
#1681	S.A.G.A. #1-Adventureland (Adventure International)	**$25.39**
#9581	Slide Show (C & H Video)	**$42.39**
#8208	Sort Rom (Soft Control)	**$33.89**
#8700	Space Tablet 3-Axis (MCS)	**$335.69**
#8701	Space Tablet 4-Axis (MCS)	**$446.19**
#8640	Speed Read Plus (Optimized)	**$50.89**
#4657	Swordthrust #6-Eternal Curse (CE Soft)	**$25.39**
#4658	Swordthrust #7-Hall of Alchemie (CE)	**$25.39**
#2265	Visifactory (Micro Lab)	**$63.69**

SPECIAL

With any order over $49.00 (COD's excluded) receive FREE a copy of the program Mail Ordering (on disk for Apple). This program will allow you to make up mail orders with just a few keystrokes. Exclusively available from Huntington Computing. Ask for stock number 998.

ADVENTURE INTERNATIONAL

#1664	Adventures # 1-2-3	**$34.99**
#1665	Adventures # 4-5-6	**$34.99**
#1666	Adventures # 7-8-9	**$34.99**
#1677	Adventures # 10-11-12	**$33.89**
#1668	Apple Spice	**$26.89**
#1671	Poker Tournament	**$17.79**
#1681	S.A.G.A. #1 Adventureland	**$25.39**
#1682	S.A.G.A. #2 Pirate Adventure	**$25.39**
#1678	Stone of Sisyphus	**$25.39**

AVALON HILL

#2050	B-I Nuclear Bomber (Cassette)	**$12.99**
#2057	Computer Acquire (Cassette)	**$16.99**
#2063	Computer Stocks & Bonds	**$13.59**
#2056	Conflict 2500 (Cassette)	**$12.69**
#2060	Empire of the Overmind (Cassette)	**$25.49**
#2059	Empire of the Overmind	**$24.99**
#2055	Lords of Karma (Cassette)	**$16.99**
#2058	Major League Baseball	**$25.49**
#2051	Midway Campaign (Cassette)	**$12.69**
#2052	North Atlantic Convoy (Cassette)	**$12.69**
#2053	Nuke War (Cassette)	**$12.69**
#2054	Planet Miners (Cassette)	**$12.69**
#2062	Tanktics (Cassette)	**$20.39**
#2061	Tanktics	**$24.59**

AVANT-GARDE

#7003	Chambers of Xenobia	**$13.49**
#7000	Creativity Tool Box	**$38.19**
#7005	Five Great Games	**$25.39**
#7004	Five More Great Games	**$25.39**
#7008	Race for Midnight	**$25.39**
#7006	Sentence Diagramming	**$21.19**
#7010	Sounds & Scrolling	**$16.09**
#7011	Super Draw & Write	**$15.79**
#7009	Super Shape Draw	**$16.89**
#7015	Word Scrambler	**$16.89**
#7016	Zero Gravity Pinball	**$25.39**

Softlights

By Fred Huntington

It's an exciting time around the Huntington household this month. We're very proud to announce the birth of our seven-pound five-ounce baby boy, Dale, born on June 6, 1982 in Visalia, California. Baby and Mama are doing just great and Melody (our three-year-old) loves him and calls him "My baby."

The other big news is that I have resigned my position as school principal so that I may devote full time to Huntington Computing.

We're instituting lots of changes to improve efficiency and speed. Our goal is to get everything out of the door within twenty-four hours with no backorders.

To celebrate the excitement, we're offering the following specials: (Always an excuse to run a sale.)

#9010 **Wurst of Huntington**
List $19.99, **now $9.99**

#4403 **Gold Rush (Sentient)**
List $34.95, **now $25.69**

#1967 **Arcade Machine (Broderbund)**
List $44.95, **now $34.49**

#1970 **Chop Lifter (Broderbund)**
List $34.95, **now $25.69**

#4002 **Verbatim Datalife Disks**
(w/plastic box & hub rings)
List $45.00, **now $25.99**

#9140 **Great Grandma Huntington**
T-Shirt - $5.00

GREAT GRANDMA SAYS

Great Grandma Huntington once told me about a computer the Russians invented that was so smart it defected to the West!

Great Grandma also said, "Please buy little Freddy's Wurst of Huntington, because he personally gets two dollars for every one he sells. And, it's good. Just read the review in October 1981 issue of Softalk.

Watch next month's Softlights for the winners of the Great Grandma Huntington contest. There were some fantastic entries.

BRODERBUND

#1960	Alien Typhoon	**$21.19**
#1963	Apple Panic	**$25.39**
#1967	Arcade Machine	**$39.49**
#1966	David's Midnight Magic	**$30.69**
#1952	Galactic Empire	**$22.99**
#1954	Galactic Revolution	**$22.99**
#1953	Galactic Trader	**$22.99**
#1951	Galaxy Wars	**$22.99**
#2000	Genetic Drift	**$25.39**
#1957	Golden Mountain	**$16.89**
#1950	Hyper Head-on	**$21.99**
#1962	Labyrinth	**$25.39**
#1961	Payroll	**$335.69**
#1968	Star Blazer	**$27.09**
#1956	Tank Command	**$12.99**
#1955	Tawala's Last Redoubt	**$25.39**
#1959	Track Attack	**$26.89**

MISCELLANEOUS

#8800	Adam & Eve Paddles (Tech Designs)	**$33.89**
#7890	Apple-cillin II (XPS)	**$33.89**
#3000	Bookkeeper (Delta)	**$76.39**
#9700	Castles of Darkness (Logical)	**$30.69**
#3001	Checkwriter (Delta)	**$33.99**
#9640	Colorblind (Energy)	**$30.69**
#9014	Computer Almanac (Huntington Computing)	**$24.99**
#6380	Crossword Magic	**$39.99**
#4401	Cyborg (Sentient)	**$28.99**
#9880	Deadline (Infocom)	**$42.39**
#9742	Electric Semicolon	**$97.69**
#9900	Financial Facts (Hanson)	**$22.99**
#9600	The Game Show	**$34.29**
#6870	Handwriting Analysis (Micro Lipp)	**$16.89**
#9840	Jabbertalky (Mind Toys)	**$26.29**
#9580	The Menu II (C & H Video)	**$33.89**
#9380	The Menu Generator	**$35.09**
#4400	OO-Topos (Sentient)	**$27.99**
#6240	Paddle-Adapple (Southern California)	**$26.89**
#7650	Pornopoly (CCI)	**$25.39**
#7920	Property Management	**$292.49**
#3400	Raster Blaster (Budgeco)	**$25.29**
#9500	Recipe Handler (Soft Touch)	**$33.09**
#9841	Ricochet (Mind Toys)	**$16.89**
#6600	Rubik's Cube (Software Alternatives)	**$16.89**
#9620	Shadow Hawk One (Horizon)	**$43.89**
#3380	Space War I (Galaxy)	**$33.89**
#4252	Star Blaster (Piccadilly)	**$25.39**
#9180	Starship Commander (Voyager)	**$35.89**
#4251	Suicide (Piccadilly)	**$26.29**
#9680	Taxman (Hal Labs)	**$19.49**
#4850	Time Lord (Ramware)	**$25.39**
#9012	Understand Yourself (Huntington)	**$24.99**
#9740	Volcanoes (Earthware)	**$43.49**
#9741	Volcanoes - Educational Version (Earthware)	**$44.49**
#9880	Zork I (Infocom)	**$33.89**
#9881	Zork II (Infocom)	**$33.89**

ON-LINE

#1120	Cranston Manor	**$29.69**
#1104	Crossfire	**$26.29**
#1126	The Dictionary	**$87.89**
#1125	M M S II	**$43.89**
#1115	Marauder	**$29.69**
#1101	Mission Asteroid	**$17.99**
#1113	Missile Defense	**$21.19**
#1102	Mystery House	**$21.19**
#1149	Pegasus II	**$25.39**
#1117	Sabotage	**$21.19**
#1105	Screenwriter II	**$99.99**
#1121	Soft Porn Adventure	**$25.39**
#1122	Threshold	**$33.89**
#1114	Ultima II	**$46.69**
#1112	Ulysses	**$29.69**
#1100	The Wizard and the Princess	**$28.89**

SIRIUS

#1058	Autobahn	**$25.39**
#1077	Bandits	**$29.69**
#1073	Borg	**$26.89**
#1065	Copts & Robbers	**$29.69**
#1053	Cyclod	**$25.39**
#1062	Epoch	**$25.39**
#1070	Joyport	**$67.39**
#1052	Minotaur	**$29.69**
#1066	Outpost	**$26.29**
#1057	Pulsar II	**$25.39**
#1071	Snake Byte	**$25.39**
#1064	Sneakers	**$25.39**
#1056	Space Eggs	**$19.99**
#1072	Twerps	**$26.89**

Call Toll-Free **800-344-5106** (outside California)

HUNTINGTON COMPUTING
Post Office Box 1297
Corcoran, California 93212

Foreign Orders 209-992-4481
In California 800-692-4146

Apple® is a registered trademark of Apple Computer, Inc.
Pet® is a registered trademark of Commodore.
TRS-80® is a registered trademark of Tandy Corp.
Atari® is a registered trademark of Atari, Inc.

Outside Calif. 800-344-5106

We take **MasterCard, American Express or VISA** (Include card # and expiration date). California residents add 6% tax. Include $2.00 for postage. Foreign and hardware extra. Foreign (excluding Canada): remit U.S. currency, checks on U.S. banks, use listed charge cards, or make direct wire transfers through Security Pacific Bank, Corcoran, for a $6.00 charge. All overseas orders shipped by air. Send for free catalog. Prices subject to change without notice.

CIRCLE 176 ON READER SERVICE CARD

128K RAM. $100.

Apple II *Senior Analyst* and Apple II *Business Graphics* are business software for financial modeling and graphics. Both programs require a 48K Apple II or Apple II Plus with a language or memory card. Apple III *Business Graphics* requires a 128K Apple III. The suggested retail prices are $225 for *Senior Analyst*, and $175 for Apple II or Apple III *Business Graphics*.

Apple III Cobol, is a Cobol language capable of executing mainframe applications. Apple III Cobol features Animator, a screen-oriented, source-level debugger and Forms-2, a Cobol source code generator which creates data entry screens and generates Cobol source for use in a program. Apple III Cobol requires a 128K Apple III system, a video display device, and at least one external floppy or hard disk drive. Full use of the Animator requires 256K. $500.

Record Processing Services, designed for Apple III Pascal software developers, provides file management services for programs handling large quantities of data. The multi-key file access method allows files to be readily interchanged among programs built on *RPS*. *RPS* supports the Apple ProFile hard disk and any other SOS block device, allows a maximum file size of 16 megabytes, permits up to eight keys per file and multi-field keys, and permits multiple simultaneous file scans, optional concurrency control and file locking. It also features six access modes, eleven data types, and duplicate and/or null key values. $150.

SuperPilot is a versatile extension of Apple Pilot. Also announced were two support products in the Apple Pilot family, *Co-Pilot* and *SuperPilot Log*. *Co-Pilot* is a self-contained, self-paced interactive tutorial on two diskettes which teaches how to program in Apple Pilot. *SuperPilot Log* works with *SuperPilot* as an administrative record keeping program. *SuperPilot* requires an Apple II or Apple II Plus with 64K RAM, $200. *Co-Pilot* is $35, and *SuperPilot Log* is $50.

Apple Logo is an implementation of the Logo computer language for the Apple II. It requires an Apple II or Apple II Plus with 64K RAM. The software package, priced at $175, includes a program diskette, a backup diskette, a graphics manual, and a language reference manual.

Eight independently developed software programs for business, education, and the home were also offered by Apple Computer. *Comm-Pac* is a data communications program that enables an Apple II to communicate with other computers, timesharing systems, networks, newswires, and other subscription services. $85.

Paralax is a collection of graphics utilities which lets the user develop and manipulate high-resolution shapes for Applesoft Basic programs. $85.

Designer's Toolkit is a program for the Apple II that computerizes the drafting table to let the user generate graphics for mapping, architecture, and drafting. $225.

Magic Spells is a learning game that transforms the memorization of spelling lists into an adventure complete with castles, treasures, demons, and a sage wizard. $45.

Math Strategy and *Spelling Strategy* are two programs that teach youngsters how to use the mind's eye to sharpen math and spelling skills. It uses Neuro-Linguistic Programming. $45 each.

Moptown is a collection of logic games for children aged four and up. $50.

Speed Reader is a reading development course designed to increase reading speed while increasing comprehension. $70.

Apple Computer, Inc., 10260 Bandley Dr., Cupertino, CA 95014. (408) 996-1010.

CIRCLE 384 ON READER SERVICE CARD

Atari Software

Four new Atari Home Computer programs, a telecommunications kit and several computer programs were announced by Atari, Inc. Atari also announced a reduction in the suggested retail price of the Atari 400 to $349.

Atari *Speed Reading*, which combines computer programs and the Speedway reading course includes five cassettes and a manual, and is recommended for users 15 years old and up. $74.95.

Atari *Music Tutor I* teaches music fundamentals such as note reading, the C Major scale, and key signatures. Both programs are available in both cassette and diskette versions.

Juggles' House and *Juggles' Rainbow* teach pre-reading skills to children aged three to six at home or in a school environment. *Juggles' House* teaches the concepts of upper, lower, inside and outside, while *Juggles' Rainbow* teaches above, below, left and right. It's available in both cassette and diskette versions.

The *Communicator II* is a kit that allows the user to explore the wide range of information, education and entertainment available through computer services, and to communicate with other computers. The Atari 835 Direct Connect Modem (DCM), the TeleLink II cartridge, and a manual are included. $279.95.

The Atari 835 DCM connects the computer directly to a phone line without the need for an acoustic coupler, although it must be used with TeleLink II. The DCM is only available with the *Communicator II* kit. The TeleLink II cartridge is priced at $79.95.

Other programs include *Asteroids*, *Computer Chess*, *Missile Command*, *Space Invaders* and *Super Breakout* for $34.95 each; *Star Raiders* for $44.95; and *Music Composer* for $39.95.

Atari Inc., 1265 Borregas Ave., P.O. Box 427, Sunnyvale, CA 94086. (408) 745-5227.

CIRCLE 385 ON READER SERVICE CARD

IXO Software & Peripherals

IXO, Inc. announced six applications for its telecomputing system—field sales, electronic mail and banking, public data base access, airline reservations and remote personal computing. The telecomputer is a hand-held system with the capability to remotely access and communicate with host computers via plain English prompts and responses. It consists of a full typewriter-style keyboard, LCD display, telephone modem and sophisticated security system, and plugs into any modular telephone jack.

ACCESS CENTER?
IXO

Four optional peripherals are available for the telecomputing system. These are a 20-column, 30 cps thermal dot matrix printer; a 32-character x 16-line video interface that works with video monitors and television receivers; a serial/parallel printer interface to enable the telecomputing system to be used with most 80-column plus printers; and, for those instances where no modular phone jack is available, an acoustic interface. $300.

IXO, Inc. 6041 Bristol Parkway, Culver City, CA 90230. (213) 417-8080.

CIRCLE 386 ON READER SERVICE CARD

VIC-20 Software

Source Marketing, Inc. has announced eight software programs designed to run on the Commodore VIC-20 home computer. Programs are on cassette tape. Offerings include five games, a home and small business management program, one educational program and an entertainment program. Suggested retail price of cassettes is $19.95.

Source Marketing, 50 West Brokaw Rd., Suite 64, San Jose, CA 95110.

CIRCLE 387 ON READER SERVICE CARD

SEARCHING FOR RECORDS CAN BE A REAL HASSLE.

Erkki Alanen

WITH DB MASTER™ IT'S EASY.

It always seems to happen at the wrong time. A file cabinet or two filled with records that are not *quite* in alphabetical order. In there somewhere is the right record, but there's just no way to find it without leafing through the whole mess. Sound familiar?

With DB MASTER finding the right record takes about *three seconds.* You just call up the name, say "Mark Piper," or invoice number "38965," and there it is in front of you. No worries. No misfiling. No anxiety. Think what it means for a business where you constantly need to check product inventories or customer billing status.

But what if you don't know the whole name or the exact number you're after? No problem. DB MASTER's "Search" method makes it simple to find what you're after. For example, you can call up all the "Pipers" and stop when you recognize the right one. And there's more. You don't even have to know the name at all. If all you really know is that it begins with a "P", for instance, you can use DB MASTER's "Wild Card" feature. It'll give you every name in your file that begins with "P". The same goes for a range of numbers. Punch in the range of digits you know, and you'll get a series to choose from. Try *that* with your filing-cabinet system.

We designed DB MASTER to make your life easier. Sure, there are other data base systems available for your Apple II. But, if you're not using DB MASTER you're simply not getting all you could from your data base manager.

Want more capability? DB MASTER provides it with the expanded-capacity Special Edition for Hard Disk to complement the popular floppy diskette version. *And* there are three powerful accessory programs. UTILITY PAK #1, for example, allows you to access other standard Apple files (including VisiCalc), and even change the way you've structured your files. UTILITY PAK #2 allows you to edit or change up to five "fields" in a single pass through your files. And STAT PAK performs statistical analyses on data in your DB MASTER files. Of course, there's considerably more capability in each of our accessory paks than we have room to talk about here. Ask your dealer for the full details.

Stoneware backs up DB MASTER with a support staff second to none. Just give us a call. We can help solve your problems. After all, that's what Stoneware and DB MASTER are all about.

STONEWARE INCORPORATED
50 Belvedere Street, San Rafael, CA 94901 (415) 454-6500

© 1982 Stoneware Incorporated. TELEX II: 910-384-2016 STONEWARE SRFL

DB MASTER is a registered trademark of DB MASTER Associates. Apple II Plus is a registered trademark of Apple Computer. VisiCalc is a registered trademark of VisiCorp.

CIRCLE 278 ON READER SERVICE CARD

VisiCalc Consolidation

Abacus Associates introduced *Viz.A.Con,* a consolidation system for the VisiCalc user. It automatically combines stored data files and prints copies of the results. *Viz.A.Con* runs on the Radio Shack TRS-80 Model III. $89.95.

Abacus Associates, Suite 240, 6565 West Loop South, Houston, TX 77401. (713) 666-8146.

CIRCLE 388 ON READER SERVICE CARD

Apple Plotting Packages

T & W Systems has expanded their product line to include the *Cadapple*, a version of the *T-Square Cad* software which runs on a standard Apple configuration. Hardware required includes a 48K Apple II with Apple Pascal 1.1, two standard 5 1/4" drives, the CCS asynchronous serial interface model 7710, monitor, joystick, or HiPad digitizer and the Houston Instruments DMP-7 plotter.

The program allows the designer to create, erase, change, store and retrieve drawings consisting of graphics and text. The *Cadapple* provides generation of arcs, circles, rectangles, ellipses, regular polygons, arbitrary curves and user defined shapes.

The *Cadapple* is available as a turnkey system, or the software and/or plotter can be purchased separately. The turnkey system including software and hardware with joystick is $9985. The turnkey system including software and hardware with HiPad is $10,775. The *Cadapple* software is $2495.

T & W Systems, Inc., 18437 Mt. Langley #B, Fountain Valley, CA 92708. (714) 963-3913.

CIRCLE 389 ON READER SERVICE CARD

Japan, Inc. goes Microsoft

Four Japanese manufacturers announced support of Microsoft's MS-DOS operating system, a 16-bit operating system developed by Microsoft for the IBM Personal Computer. Hitachi offers the MB-16001, a general purpose personal computer running Microsoft Graphics Basic. NEC offers the NEC 5200 which is designed as a high-end business machine. Panasonic supports MS-DOS on their JB-3000 microcomputer, a low-end machine with a color graphics capability. Panasonic also supports both Multiplan and Microsoft's Graphics Basic. Wang will also support MS-DOS.

Users of MS-DOS systems can run the applications programs available for the IBM Personal Computer as well as all Microsoft languages—MS-Basic interpreter and MS-Fortran, MS-Basic, MS-Pascal and MS-Cobol compilers—on their 16-bit microcomputers.

Microsoft Corporation, 10700 Northup Way, Bellevue, WA 98004. (206) 828-8080.

CIRCLE 390 ON READER SERVICE CARD

Accounting Packages

Three major manufacturers of personal microcomputer systems—Toshiba, Sony, and Xerox—will offer Structured Systems Group (SSG) accounting software (Version 2.0). The complete line of SSG accounting software (Version 2.0)—General Ledger, Accounts Receivable, Accounts Payable, Order Entry, Inventory, and Payroll—run on the Toshiba T-200250, the Xerox 820, and the Sony SMC 70 personal computer.

Structured Systems Group, 5204 Claremont, Oakland, CA 94618. (415) 547-1567.

CIRCLE 391 ON READER SERVICE CARD

Robot Programmer

Savvy is an information handling system for microcomputers. It has a natural programming language, its own operating system automatic database management, and applications programs.

Savvy learns your own language and translates it into a simple language. The Robot Programmmer has been trained to write programs needed to input, output, add, change, and delete database information. *Savvy* comes as a combination of hardware and software—a co-processor with firmware, and additional software on a disk. It will boot and run on all Apple DOS versions and Z80 versions of CP/M.

Excalibur of America, 1176 Franklin Rd., S.E., Marietta, GA 30067. (404) 953-6870.

CIRCLE 392 ON READER SERVICE CARD

NEC Software

NEC Home Electronics USA introduced an orientation to the basics of computer operating and programming. Called *Creative Programming*, the beginning software program and guidebook is designed to help early users learn microcomputer operation in four short lessons. The lessons cover computer language introductions and the significance of the basic functions, how to write a program, and how to load a program. The course is for use on the PC-8000 Series Microcomputer System. The first *Creative Programming* manual retails for $12.95. The remaining five volumes retail for $9.95 each.

The *Basic Language Learning Guide* program concentrates on the features, commands and functions of Microsoft N-Basic. Included are discussions of The Concept of a Variable, Math and the Computer, Format Notation, and Elementary Statements. In addition, there are six appendices devoted to special keys and control characters, reserved words, ASCII Character set, error messages, disk files and N-Basic statements. It is best suited for use with the NEC PC-8000. $19.95.

NEC also has a color word processing system with a self-teaching program and 12,000 word dictionary for the PC-8000.

NEC also has a *Job Costing* system which allows users to keep easier and more accurate track of internal costs by category. The Job Cost System is marketed with the PC-8000, and can interface with the NEC General Accounting System and Payroll System programs. It features a Skeleton General Ledger, Work Codes/Cost Centers, Estimates, Labor/Nonlabor Journals, Income and Expense Statement, and Job Status Report.

The *General Accounting System* for the PC-8000 can be operated by people without prior computer experience. Each Accounts Receivable diskette allows for 500 or more entries. Additional features include an 80-column data entry screen, multiple bank account capability, and capacity for eight separate payroll accounts with payroll summaries by month, quarter and year-to-date. The General Accounting System retails for $395.

Report Manager is a CP/M based program that creates and updates a variety of reports for financial, accounting, engineering and scientific applications. It features editing commands, multiple report pages, the ability to copy portions of rows, columns, or pages; and the ability to reform calculations on calendar and time entries.

Money Decisions provides a collection of business and financial problem-solving tools. Programs on the disk include 34 of the most frequently used business and financial problem-solvers. Among the financial tools included are Future Value of an Investment, Net Present Value, Internal Rate of Return, Term of a Loan, Regular Payment on a Loan, Mortgage Amortization Table, Lease/Purchase Analysis, Depreciation Rate, Tax Depreciation Schedule, Optimal Production Quantity and Breakeven Analysis.

The *Term II* program connects the PC-8000 to the world of telecommunications. Users may talk via their computer screens, transmit files to or receive files from a general purpose time sharing host system such as CompuServe or The Source.

File-Fax is a database and information management system for the PC-8000. It assures user flexibility and eliminates any requirement for following a certain pattern or structure.

NEC Home Electronics (U.S.A.) Inc., 1401 Estes Ave., Elk Grove Village, IL 60007. (312) 228-5900.

CIRCLE 393 ON READER SERVICE CARD

Fortune Business Software

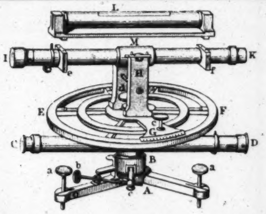
Fortune Systems Corporation introduced for its desktop computer a package of business accounting software that has been transported to the Fortune 32:16, the company's Motorola MC68000-based microcomputer. The menu-driven accounting system consists of seven modules: order processing, accounts receivable, purchase orders, accounts payable, payroll, fixed assets and general ledger. The business system also features file protection, a password security system and user-selected formatting and report generation capabilities. The Fortune 32:16 supports Cobol, Fortran, Pascal and C as well as Basic. The system is based on the Motorola MC68000 32/16-bit chip and uses the Unix operating system. The 32:16 also has Ethernet communications capability. Price is $4,995.

Fortune Systems has signed a license agreement with the IMJ Software Center that provides the Fingraph graphic management information system. This package is used to provide graphic displays of sales management, accounts receivable, income statements and balance sheets. More than 100 standard information charts can be produced directly from the computerized data sheets.

Fortune Systems Corporation has entered into a licensing agreement with Microsoft Corporation to enhancee the Unix operating system. The agreement calls for a technical exchange and makes Fortune Systems the master distributor for the finished product. Microsoft will initially supply Microsoft-developed system enhancements that Fortune Systems can add to its version of Unix. The company will also provide ongoing support and maintenance to Fortune Systems for the operating system.

Fortune Systems Corporation, San Carlos, CA (213) 557-1331.

CIRCLE 394 ON READER SERVICE CARD



Happy Hands

Offers Discounts on All

TRS-80™ COMPUTERS

We Have What You Are Looking For

- *Free Shipping Within United States*
- *26-1006 Mod III 48K $2,055.00*
- *26-3001 4K Color 310.00*
- *26-3002 16K Color 455.00*
- *26-3003 32 K Color 520.00*
- *No Tax On Out of State Shipments*

For Additional Prices and Shipping Information Call Toll Free
1-800-545-9019
N.M. Residents Call 257-7865

or write

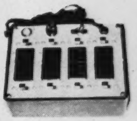
HAPPY HANDS
P.O. DRAWER I
RUIDOSO, NEW MEXICO
88345

CIRCLE 174 ON READER SERVICE CARD

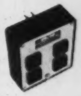
POWER LINE PROBLEMS?

SPIKE-SPIKERS™
THE SOLUTION

Protects, organizes, controls computers & sensitive electronic equipment. Helps prevent software "glitches", unexplained memory loss, and equipment damage. Filter models attenuate conducted RF interference.



DELUXE POWER CONSOLE $79.95
Transient absorber, dual 5-stage filter, 8 individually switched sockets, fused.



QUAD-II $59.95
Transient absorber. Dual 3 stage filter, 4 sockets.

QUAD-I $49.95
Transient absorber, 4 sockets.

MINI-II $44.95
Transient absorber, 3 stage filter, 2 sockets.

MINI-I $34.95
Transient absorber, 2 sockets.

KALGLO Electronics Co. Inc.
Colony Drive Ind. Park
6584 Ruch Rd., Dept.
Bethlehem, PA 18017

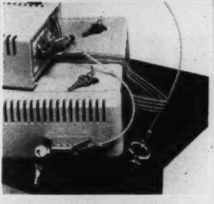
215-865-0006
Out of State Order Toll Free
800-523-9685

DEALER INQUIRIES INVITED

CIRCLE 186 ON READER SERVICE CARD

accessories for the well dressed apple.

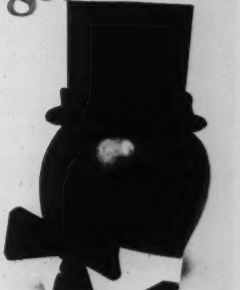
apple cart
Heavy duty metal with casters. 25"w. x 25"d. x 38-48"h. with optional 32½" w. table top ($16.00 extra).
$199^00



apple locker
A security locking device, with locks, connectors, cables, and full installation instructions.
$78^50

apple sack
Transport your APPLE, one or two disk drives, accessories, cables and diskettes all in this soft vinyl bag.
$98^00

VISA
MasterCard



FOR MORE INFORMATION CONTACT:

TELE TERMINALS
7008 Northland Drive, Brooklyn Park, MN 55428, Phone (612) 536-6000
MN Wats 800/442-3006 • NAT Wats 800/328-3072

CIRCLE 289 ON READER SERVICE CARD

computer mail order west

ATARI

400

16K . . . $269

32K . . . $389

48K . . . $489

800

16K . . . $649

32K . . . $724

48K . . . $769

410 Recorder	$76.00
810 Disc Drive	$449.00
822 Printer	$269.00
825 Printer	$589.00
830 Modem	$159.00
820 Printer	$259.00
850 Interface	$169.00
CX40 Joy Stick	$18.00
CX853 16K RAM	$77.95

Microtek 16K RAM	$74.95
Microtek 32K RAM	$119.95
Ramdisk (128K)	$429.95
Intec 48K Board	$219.95
Intec 32K	$119.95
One year extended warranty	$70.00
481 Entertainer	$69.00
482 Educator	$130.00
483 Programmer	$49.00
484 Communicator	$344.00

FRANKLIN ACE 1000

64K Personal Computer

Hardware, software and peripheral compatable with the Apple II and even has some features not found on the Apple.

Call now for best price!!

HOT ATARI GAMES

PAC-MAN	$35.00
Centipede	$35.00
Caverns of Mars	$32.00
Asteroids	$29.00
Missile Command	$29.00
Star Raiders	$39.00
Canyon Climber	$25.00
Protector	$24.00
Mouskattack	$31.00
Jawbreaker	$27.00
Ghost Hunter	$24.00

K-BYTE

ROM CARTRIDGE GAMES FOR YOUR ATARI

Krazy Shoot Out	$39.00
K-razy Kritters	$39.00
K-razy Antics	$39.00
K-star Patrol	$39.00

STICK STAND

$6.99

ARCADE ACTION FROM YOUR ATARI JOYSTICK

PERCOM

Finally, a dual disk drive for the Atari 800/400. Both single and dual drive models read both sides of the disk! Will read all disks written for Atari 810. *CALL FOR INTRODUCTORY PRICE!*

Telecommunications Modems

Hayes	
Smart	$239.00
Chronograph	$199.00
Micromodem II	$279.00
Micromodem 100	$309.00
Novation Auto	$239.00
D Cat	$169.00
Cat	$159.00
Anchor Modem	$79.00

AMDEK MONITORS

300G	$169.00
Color I	$339.00
Color II	$699.00
Color III	$429.00

OTHERS

Zenith 9" (Green)	$119.00
BMC 12" Green	$85.00

NEC

COMPUTERS

8001-A	$749.00
8031	$749.00
8012	$549.00

PRINTERS

8023	$549.00
7710/7730	$2399.00
3510/3530	$1789.00

MONITORS

JB-1201	$179.00
JC-1201	$349.00
JC-1202	$899.00

VISICORP

VISICALC	
Apple II +	$189.00
Atari	$189.00
Commodore	$189.00
IBM	$189.00

Also available are:

VISIDEX
VISIFILE
VISIPACK
VISIPLOT
VISITERM
VISITREND

SOFTWARE

We stock manufacturer's and third party software for most all computers on the market! Call today for a copy of our new

CATALOG

You'll find programs by Atari, APX, Data Soft Crystal Software, EPYX, Synapse, OnLine, Arcade Plus, K-BYTE, Magis, Canadian Micro Professional Software, Creative Software, BPI, VISICORP, Commodore, NEC and of course our own!

Maxell Disks

MD I (box of 10)	$36.00
MD II (box of 10)	$46.00
MFD I (8")	$44.00
MFD II (8" Double Density)	$54.00
Syncom (box of 10)	$29.00

Computer Covers

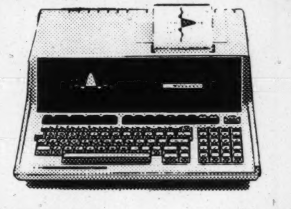
Atari 400	$6.99
Atari 800	$6.99
Atari 810	$6.99
Commodore VIC-20	$6.99
Commodore 8032	$14.99
Commodore 8050/4040	$10.99

west 800-648-3311

In Nevada
CALL
(702)588-5654

P.O. Box 6689
Stateline,
NV. 89449

HEWLETT PACKARD



HP•85 $1969

HP•87	$1799.00
HP•125	$1999.00
HP•85 16K Memory Module	$169.00
5¼" Dual Master Disc Drive	$1799.00
Hard Disk w/ Floppy	$4349.00
Hard Disk	$3549.00
"Sweet Lips" Plotter	$1199.00
80 Column Printer	$649.00

CBM 8032

$999

Commodore Business Machines

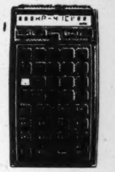
CBM 64	CALL
4032	$969.00
8096 Upgrade Kit	$369.00
Super Pet	$1599.00
2031	$529.00
8250 Doubled Sided Disk Drive	$1699.00
D9060 5 Megabyte Hard Disk	$2399.00
D9090 7.5 Megabyte Hard Disk	$2699.00
8050	$1299.00
4040	$969.00
8300 (Letter Quality)	$1799.00
8023	$769.00
4022	$499.00
Pet to IEEE Cable	$37.00
IEEE to IEEE Cable	$46.00
Tractor Feed for 8300	$240.00

Word Pro 5 +	$319.00
Word Pro 4 +	$299.00
Word Pro 3 +	$199.00
The Administrator	$379.00
InfoPro Plus	$219.00
Power	$79.00

HEWLETT PACKARD

HP 41CV CALCULATOR

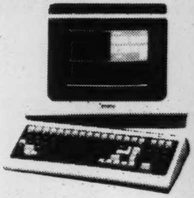
$239



HP 41C	$189.00
HP 11C	$79.00
HP 12C	$114.00
NEW 15C	$119.00
NEW 16C	$125.00

HPIL PERIPHERALS IN STOCK!

Televideo Terminals



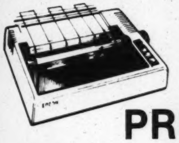
910	$579
912C	$699
920C	$749
925C	$749
960	$939

802	$Call
802H	$Call
816	$Call
806	$Call

VIC 20

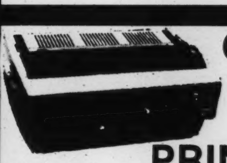
$239

VIC 1530 Commodore Datassette	$69.00
VIC 1540 Disk Drive	$499.00
VIC 1515 VIC Graphic Printer	$339.00
VIC 1210 3K Memory Expander	$32.00
VIC 110 8K Memory Expander	$53.00
16K VIC Expansion	$94.00
VIC 1011 RS232C Terminal Interface	$43.00
VIC 112 VIC IEEE-488 Interface	$86.00
VIC 1211 VIC 20 Super Expander	$53.00
VIC Mother Board	$99.00



EPSON PRINTERS

MX 80 w/Graftrax	$449
MX 80 FT III	CALL
MX 100	CALL
ADA 1600 Parallel Printer to CBM	$119.00
ATC-1 Parallel Printer to Atari	$29.00
AP-80 Apple Parallel Card & Cable	$69.00
IBM-1 Parallel Printer to IBM	$32.00



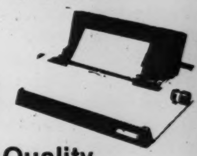
CITOH PRINTERS

Starwriter	
F10-40CPS	$1439.00
F10-55CPS	CALL
Prowriter	$499.00

ADA 1450 Serial Printer to CBM	$139.00
ATC-2 Serial Printer to Atari	$29.00
AP-S10 Apple Serial Card & Cable	$95.00

Smith-Corona

TP-I



$649

Letter Quality
Daisy Wheel
12 CPS Text Printer

In-stock items shipped same day you call. No risk, no deposit on C.O.D. orders. Pre-paid orders receive free shipping within the continental United States with no waiting period for certified checks or money orders. All prices shown are cash prices. Add 3% for Mastercard and Visa. NV and PA residents add sales tax. All items subject to availability and price change.

CENTRONICS PRINTERS

739-1	$519
739-3	$619
2 Meter RS232-RS232 Cables	$29.95

— ALSO —

Diablo 630 Special	$1799.00
Talley 8024-L	$1629.00
IDS Prism	CALL

OKIDATA PRINTERS

82A	$489.00
83A	$729.00
84	$1099.00

NOTE
All of the above OKIDATA Printers come equiped with both parallel ports & RS232 Serial ports.

800-233-8950 east

477 E.
THIRD ST.
Williamsport
PA 17701

IN PA
CALL
(717)327.9575

computer mail order east

CIRCLE 140 ON READER SERVICE CARD

The Handicapple

A Low Cost Braille Printer

Barry McConnell

One of the most valuable features of the home computer is its versatility. Home computers have found a place in the laboratory, the classroom, and in the office. Most recently, they have found a place with the handicapped.

The low cost and easy adaptability of the home computer makes it an ideal tool for serving the needs of the handicapped, both on the job and in the home.

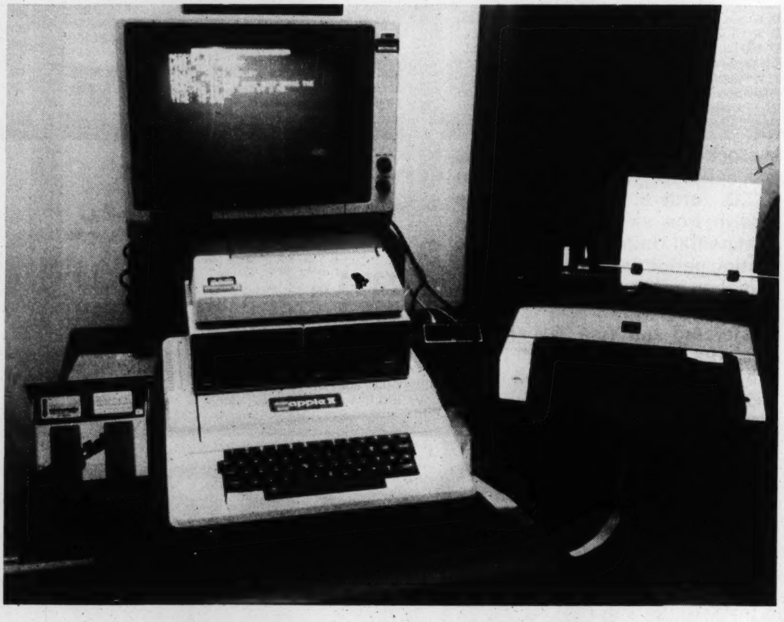
At Florida State University, handicapped students are competing with non-handicapped students on an equal basis and are finding new career opportunities through the use of home computers. This article outlines one of several ways in which microcomputers have been adapted to the needs of the handicapped.

One of the first things anyone working with a computer needs is a printed copy of his work. A multitude of printers can be found in the marketplace, but what of the blind individual? How does he read what comes out of the computer? There are very few braille terminals on the market and they tend to be prohibitively expensive for the average person. Additionally, braille terminals, since their design is similar to that of a line printer, are not well suited to word processing or other forms of formatted output. A low cost alternative is available.

Often promoted as the "poor man's printer," the Dynatyper by Rochester Data, Inc. provides the key to low cost braille. The Dynatyper is a solenoid driven array of plastic plungers which sits above the keyboard of a standard typewriter. When coupled with an IBM Braillewriter and a home computer, it gives blind people access to hard-copy braille at an affordable price.

Our emphasis at FSU has been on the use of off-the-shelf components to keep costs down and application simple. This configuration fits well in both the home and in the workplace at a minimal price.

Our system consists of an Apple II, a Dynatyper, and a Braillewriter (see Figure 1). Set-up of the system is reasonably



Barry McConnell, P.O. Box 2676, Tallahassee, FL 32304.

LOWER PRICES, COME HELL OR HIGH WATER.

> “I'll match any advertised price on any item you want to buy from us. And if—Heaven forbid!—you find a lower price on what you bought within 30 days, just show me the ad and I'll refund the difference.”

—Old Nick for
DISCOUNT SOFTWARE

CP/M

	DISK WITH MANUAL / MANUAL ONLY
ARTIFICIAL INTELLIGENCE*	
Medical(PAS-3)	$849/$40
Dental (PAS-3)	$849/$40
ASYST DESIGN*/FRONTIER	
Prof Time Accounting	$549/$40
General Subroutine	$269/$40
Application Utilities	$439/$40
DIGITAL RESEARCH*	
CP/M 2.2	
NorthStar	$149/$25
TRS-80 Model II (P+T)	$159/$35
Micropolis	$175/$25
✓ CP/M-Intel MDS	$135
PL/1-80	$459/$35
BT-80	$179/$30
MAC	$ 85/$15
RMAC	$179/$25
Sid	$ 65/$15
Z-Sid	$ 90/$15
Tex	$ 90/$15
DeSpool	$ 49/$10
CB-80	$459/$35
CBasic-2	$119/$20
Link-80	$ 90/$10
FOX & GELLER	
✓ Quickscreen	$135/$na
✓ Quickcode	$265/$na
✓ dutil	$ 65/$na
MICRO-AP*	
S-Basic	$269/$25
Selector IV	$295/$35
Selector V	$495/$50
MICRO DATA BASE SYSTEMS*	
HDBS	$269/$35
MDBS	$795/$40
DRS or QRS or RTL	$269/$10
MDBS PKG	$1999/$60
MICROPRO*	
WordStar	$289/$60
Customization Notes	$449/$na
Mail-Merge	$ 99/$25
WordStar/Mail-Merge	$369/$85
DataStar	$249/$60
WordMaster	$119/$40
SuperSort I	$199/$40
Spell Star	$175/$40
CalcStar	$259/$na
MICROSOFT*	
Basic-80	$298
Basic Compiler	$329
Fortran-80	$349
Cobol-80	$589
M-Sort	$175
Macro-80	$144
Edit-80	$ 84
MuSimp/MuMath	$224
MuLisp-80	$174
Multi Plan	Call
Manager Series	Call
ORGANIC SOFTWARE*	
TextWriter III	$111/$25
DateBook II	$269/$25
Milestone	$269/$30
OSBORNE*	
General Ledger	$ 59/$20
Acct Rec/Acct Pay	$ 59/$20
Payroll w/Cost	$ 59/$20
All 3	$129/$60
All 3 + CBASIC-2	$199/$75
✓ Enhanced Osborne (Includes CBasic)	$269/$60
PEACHTREE*	
General Ledger	$399/$40
Acct Receivable	$399/$40
Acct Payable	$399/$40
Payroll	$399/$40
Inventory	$399/$40
Surveyor	$399/$40
Property Mgt	$799/$40
CPA Client Write-up	$799/$40
P8 Version	Add $129
MagiCalc	$269/$25
✓ "Peach Pak" Series 4	$1195/$na
Other	less 10%
STAR COMPUTER SYSTEMS	
G/L, A/R, A/P, Pay	$ 359
All 4	$1129
Legal Time Billing	$ 849
Property Mngmt	$ 849
STRUCTURED SYSTEMS*	
Business Packages, Call for Price	
SORCIM*	
SuperCalc	$269/$na
Trans 86	$115
Act	$157
SUPERSOFT*	
Ada	$270/$na
Diagnostic I	$ 49/$20
Diagnostic II	$ 84/$20
Disk Doctor	$ 89/$20
Forth (8080 or Z80)	$149/$25
Fortran	$219/$30
Fortran w/Ratfor	$289/$35
C Compiler	$225/$20
Star Edit	$189/$30
Scratch Pad	$174/$15
StatsGraph	$174/$15
Analiza II	$ 45/$na
Dataview	$174/$15
Disk Edit	$ 89/$15
Encode/Decode II	$ 84/$15
Optimizer	$174/$15
Super M List	$ 68/$15
Term II	$179/$15
Zap Z-8000	$450/$15
Utilities I	$ 54/$na
Utilities II	$ 54/$na
ACCOUNTING PLUS	
1 Module	$385/$na
4 Modules	$1255/$na
All 8	$4500/$na
TCS*	
GL or AR or AP or Pay	$ 79/$25
All 4	$269/$99
Inventory	$ 79/$25
Compiled each	$ 99/$25
UNICORN*	
Mince	$149/$25
Scribble	$149/$25
Both	$249/$50
The Final Word	$270/$25
WHITESMITHS*	
"C" Compiler	$600/$30
Pascal (incl "C")	$850/$45
"PASCAL"	
Pascal/MT + Pkg	$449/$30
Compiler	$315
Sp Prog	$175
Pascal/Z	$349/$30
Pascal/UCSD 4.0	$670/$50
Pascal/M	$355/$20
Tiny Pascal	$ 76/$15
"DATA BASE"	
FMS-80	$894/$45
dBASE II	$595/$50
Condor II	$899/$50
FMS-81	$445/$na
"WORD PROCESSING"	
WordSearch	$179/$50
SpellGuard	$229/$25
VTS/80	$259/$65
Peachtext	$289/$45
Magic Spell	$269/$25
Spell Binder	$349/$45
Select	$495/$na
The Word	$ 65/$na
✓ The Word Plus	$145/$na
✓ Palantier-I (WP)	$385/$na
"COMMUNICATIONS"	
✓ Ascom	$149/$15
✓ BSTAM	$149/$na
✓ BSTMS	$149/$na
✓ Crosstalk	$139/$na
✓ Move-it	$ 89/$na
"OTHER GOODIES"	
Micro Plan	$419/$na
Plan 80	$269/$30
Target (Interchange)	$125/$30
Target (Planner)	$189/$30
Target (Task)	$299/$30
Plannercalc	$ 50
Tiny "C"	$ 89/$50
Tiny "C" Compiler	$229/$50
Nevada Cobol	$179/$25
MicroStat	$224/$25
Vedit	$130/$15
MiniModel	$449/$50
StatPak	$449/$40
Micro B+	$229/$20
Raid	$224/$35
String/80	$ 84/$20
String/80 (source)	$279/$na
ISIS CP/M Utility	$199/$50
Lynx	$199/$20
Supervyz	$ 95/$na
CP/M Power	$ 75/$na
Mathe Magic	$ 95/$na
✓ CIS COBOL	$765/$na
✓ ZIP	$129/$12
Real Estate Analysis	$116/$na

APPLE II*

BRODERBUND	
G/L (with A/P)	$444
Payroll	$355
INFO UNLIMITED*	
EasyWriter (Prof)	$155
Datadex	$129
EasyMailer (Prof)	$134/$75
Other	less 15%
MICROSOFT*	
Softcard (Z-80 CP/M)	$298
Fortran	$179
Cobol	$499
Tasc	$139
Premium Package	$699
MICROPRO*	
Wordstar	$269/$60
MailMerge	$ 99/$25
Wordstar/MailMerge	$349/$85
SuperSort I	$159/$40
Spellstar	$129/$40
CalcStar	$175/$40
DataStar	$265/$60
PERSONAL SOFTWARE/ VISICORP*	
Visicalc 3.3	$219
Desktop/Plan II	$219
Visiterm	$ 90
Visidex	$219
Visiplot	$180
Visitrend/Visiplot	$259
Visifile	$219
✓ Visischedule	$259
PEACHTREE*	
G/L, A/R, A/P, Pay or Inventory (each)	$224/$40
✓ Peach Pack	$795
✓ **SYSTEMS PLUS**	
Accounting Plus II, G/L, AR, AP, or Inventory (each) (Needs G/L to run)	$385/$na
"OTHER GOODIES"	
Micro Courier	$219
Super-Text II	$127
Data Factory	$134
DB Master	$184
Versaform VS1	$350
VH1	$445

16-BIT SOFTWARE

WORD PROCESSING	
IBM PC	
Wordstar	$289
Mailmerge	$109
Easywriter	$314
Easyspeller	$159
Select/Superspell	$535
Write On	$116
Spellguard (also available for 8" 8086 systems)	$229
SP Law (for Spellguard)	$115
Textwriter III	$189
Spellbinder	$349
Final Word	$270
LANGUAGE UTILITIES	
IBM PC	
Crosstalk	$174
BSTAM	$149
BSTMS	$149
8" 16-BIT SYSTEMS	
Pascal MT+ /86, SSP	$429
CBasic 86	$294
Pascal M/86	$445
Act 86	$157
Trans 86	$115
XLT 86	$135
16-BIT 8" AND DISPLAYWRITER	
CP/M 86	$294
MP/M 86	$585
OTHERS	
IBM PC	
SuperCalc	$269
VisiCalc	$219
Easyfiler	$359
Mathemagic	$ 89
CP/M Power	$ 65
Condor 21	$265/$35
Condor 22	$535/$35
Condor 23	$895/$35
Condor 20Q	$175/$na
Condor 20R	$265/$na
Statpak	$449/$40
Optimizer	$174/$na
Desktop Plan II	$219
Desktop Plan III	$259
Visidex	$219
Visitrend	$259
TCS G/L, A/R, A/P, Pay, Inventory (requires 128K RAM) each	$129
Entire Package	$450
Many others available for use with the "Baby Blue Board*"	
8" 16-BIT SOFTWARE	
SuperCalc	$269
CP/M Power	$ 65

ORDERS ONLY—CALL TOLL FREE—VISA—MASTERCHARGE

1-800-854-2003 ext. 823 • Calif. 1-800-522-1500 ext. 823

Outside Continental U.S.—add $10 plus Air Parcel Post • Add $3.50 postage and handling per each item • California residents add 6% sales tax • Allow 2 weeks on checks, C.O.D. $3.00 extra • Prices subject to change without notice • All items subject to availability • ®—Mfr. trademark—Blue Label $3.00 additional per item.

DISCOUNT SOFTWARE

GOT A QUESTION?
CALL OUR HOT LINE: 213-837-5141.

THE DISCOUNT SOFTWARE GROUP
6520 Selma Ave., Suite 309 • Los Angeles, CA 90028
• (213) 837-5141 • In't TELEX 499-0446 DISCSOFT LSA
• USA TELEX 194-634 (Attn: 499-0446)
• TWX 910-321-3597 (Attn: 499-0446)

THE ULTIMATE SOFTWARE PLAN
CIRCLE 157 ON READER SERVICE CARD

simple and well described in the Dynatyper manual, which is fairly straightforward though not always easy reading. The only alterations required to the standard configuration consist of a modification of the braille typewriter and a change in the driving software for the Dynatyper.

The Braillewriter is an IBM office typewriter which is converted to type in braille, and has a keyboard consisting of the standard letters, numbers, and punctuation found on an ordinary typewriter.

The shifted keys provide the Grade II contractions used as a form of Braille shorthand. The paper is embossed from the front by raised dots on the typeface and rolls backwards so that the finished paper comes out the rear of the machine.

The modification necessary to operate as a braille printer is a result of the Braillewriter being designed for the blind. The tension springs on the keys are deliberately stiff so as to provide a positive keystroke for a blind individual.

These springs must be stretched as the Dynatyper was designed to operate principally with electric typewriters. Initially, the keys were so stiff that the Dynatyper plungers literally bounced off the keys. The service representative from IBM was very helpful in diagnosing the problem and remedying it.

The modification to the Dynatyper software consisted of designing an alternate character set for braille. Anyone familiar with braille will tell you that it was definitely not designed by a mathematician, as the same dot pattern may mean two entirely different things, depending on the context. For example, the period and dollar sign have the same dot pattern, but a dollar sign is never found at the end of a sentence.

Because we were committed to low cost and easy implementation, we altered the braille character set rather than developing a context analyzing driving routine, which would have required many manhours in development and would have increased drastically the time necessary to print even the simplest document.

One of the first things anyone working with a computer needs is a printed copy of his work.

The availability of the Grade II contractions on the Braillewriter provided a source of extra dot patterns for redefining characters. By converting lower case letters to upper case and assigning a Grade II symbol to each of the special characters, e.g. comma, period, etc., a one-to-one correspondence between the computer keyboard and a braille character was obtained. Special care was taken in redefining characters to make the dot pattern resemble the actual shape of the character whenever possible (see Table 1), in order to facilitate learning of the new character set.

Implementation of the new character set was greatly enhanced by the manner in which the driving routine is loaded; it is loaded from DATA statements by a Basic program. The manual provided for the Dynatyper gives excellent instructions on modifying the existing character set by changing the DATA statements.

Listing 1 shows the line numbers and the data necessary to implement the new character set in Applesoft. Integer applications would modify the array D located in lines 4350 through 4460, using assignment statements rather than DATA statements. The TRS-80 version requires modification of lines 1190 through 1300, starting with the second DATA value (209) on line 1190.

In 18 months of operation, this system has proven to be remarkably durable. It has survived two changes of offices, more than fifty conferences and demonstrations, and a tremendous number of tinkering sessions, with the most serious problem being an occasional key jam. The system is operating at the maximum recommended speed for the Dynatyper with a manual typewriter; slowing the speed would eliminate even those rare key jams.

This system has been coupled with a Control Data Corporation mainframe as a remote terminal providing braille copy to computer science students, and with two different word processing programs for the Apple, *Professional Easywriter* and *Applewriter*, though the carriage width and the size of a braille character allow only 40 characters on a line. It has also proven to be an excellent tool for programming the Apple itself, providing program listings in braille for blind programmers.

Many other applications are possible, and if the spark and enthusiasm of the blind individuals who have worked with this system thus far is any indication, they will soon be demanded. As one blind student said, "Don't give me a handout, give me the tools and I'll build you a world! ☐

Table 1.

Uppercase A - Z: Standard Braille

Digits 0 - 9 : Standard Braille lowered one dot position (e.g. 1 = dot 2   2 = dots 2,3 3 = dots 2,5)

Special Characters:

! = dots 4,5,6
" = dots 4,5
= TH
$ = BLE
% = ED
& = THE
' = '
(= GH
) = AR
: = dots 4,6
* = OW
- = COM
(=) = AND

, = dot 5
. = dot 6
/ = /
< = ING
> = SH
? = ER
; = dots 5,6
+ = OU
@ = CH
[= OF
] = WITH
^ = dot 4

Listing 1.

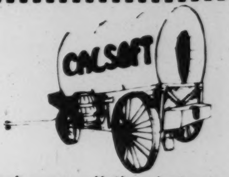
```
5360  DATA   236,251,240,157,238,
      246,160
5370  DATA  221,250,239,244,28,15
      4,187,159
5380  DATA  208,209,210,211,212,2
      13,214,215
5390  DATA  216,217,30,218,245,24
      9,237,241
5400  DATA  235,161,162,163,164,1
      65,166,167
5410  DATA  168,169,170,171,172,1
      73,174,175
5420  DATA  176,177,178,179,180,1
      81,182,183
5430  DATA  184,185,186,242,214,2
      47,224,218
5440  DATA  214,161,162,163,164,1
      65,166,167
5450  DATA  168,169,170,171,172,1
      73,174,175
5460  DATA  176,177,178,179,180,1
      81,182,183
5470  DATA  184,185,186,217,251,2
      08,187,0
```

apple discount software

CALSOFT

Personal—Entertainment—Business

SOFTWARE



We have all the latest software—ASK US!

ATARI, IBM PC, CP/M: send for FREE catalog!

Low Discount Prices / 15 to 25% Discount off List Price
Fast Convenient Service / We ship same or next day
Large Selection of Software / Call or Write for our FREE Catalog!

***Call Toll Free:** (800) 423-5290 **In California:** (213) 991-9641*

AVANT-GARDE

		Retail Price	Our Price
Hi-Res Secrets		125.00	**106.25**
Hi-Res Computer Golf		29.95	**25.45**
Zero Gravity Pinball		29.95	**25.45**

BRODERBUND

Apple Panic		29.95	**25.45**
★ Genetic Drift		**29.95**	**22.45**
David's Midnight Magic		34.95	**29.70**
The Arcade Machine		44.95	**38.20**
Track Attack		29.95	**25.45**
★ Star Blazer		**31.95**	**23.95**
Labyrinth		29.95	**25.45**
★ Choplifter	**NEW**	**34.95**	**26.20**
Deadly Secrets	NEW	34.95	**29.70**
Serpentine	NEW	34.95	**29.70**

CAVALIER

The Asteroid Field		24.95	**21.20**
Star Thief		29.95	**25.45**
Bug Attack		29.95	**25.45**
★ Microwave		**34.95**	**26.20**

CONTINENTAL

★ Home Accountant		**74.95**	**56.20**
Home Money Minder		34.95	**29.70**
★ CPA Modules #1-4 (each)		**250.00**	**187.50**
First Class Mail	NEW	74.95	**63.70**

DATA MOST

Snack Attack		29.95	**25.45**
Thief		29.95	**25.45**
County Fair		29.95	**25.45**
★ Swashbuckler		**34.95**	**26.20**
Casino		39.95	**33.95**
Expand-a-Port		69.95	**59.40**
World Series Baseball	NEW	29.95	**25.45**
Missing Ring	NEW	29.95	**25.45**

EDU-WARE

Empire I World Builders		32.95	**28.00**
Empire II Interstellar Sharks		32.95	**28.00**
Rendezvous	NEW	39.95	**33.95**

GEBELLI

Firebird		29.95	**25.45**
Russki Duck		34.95	**29.70**
★ Horizon V		**34.95**	**26.20**
Neptune	NEW	29.95	**25.45**
Lazer Silk	NEW	29.95	**25.45**
Zenith	NEW	34.95	**29.70**
Phaser Fire	NEW	29.95	**25.45**

HAYDEN

Sargon II		34.95	**29.70**
Applesoft Compiler 3.3		175.00	**148.75**
★ Pie Writer		**149.95**	**112.45**

INFOCOM

Zork I		39.95	**33.95**
Zork II		39.95	**33.95**
★ Deadline		**49.95**	**37.45**

MICROSOFT

		Retail Price	Our Price
Adventure		29.95	**25.45**
Typing Tutor II		24.95	**21.20**
Olympic Decathlon		29.95	**25.45**
★ TASC Compiler		**175.00**	**131.25**

MUSE

Super Text 40/80		175.00	**148.75**
Castle Wolfenstein		29.95	**25.45**
Frazzle	NEW	24.95	**21.20**
Firebug	NEW	24.95	**21.20**

ON-LINE SYSTEMS

HI-RES Adventures 0-5			**15% OFF**
★ Cross Fire		**29.95**	**22.45**
LISA		79.95	**67.95**
LISA Educational System		119.95	**101.95**
★ General Manager		**219.95**	**164.95**
Threshold		39.95	**33.95**
Screen Writer		129.95	**110.45**
Screen Writer Professional		199.95	**169.95**
The Dictionary		99.95	**84.95**
Expediter II+		134.95	**114.70**
Jawbreaker		29.95	**25.45**
★ Mouskattack		**34.95**	**26.20**
Marauder		34.95	**29.70**
Ultima II		59.95	**50.95**
EPF IV		79.95	**67.95**
Frogger		34.95	**29.70**
Cannonball Blitz		34.95	**29.70**
The Artist		79.95	**67.95**
★ Laf-Pak		**34.95**	**26.20**
Pest Patrol		29.95	**25.45**

VISICORP

Visiplot		200.00	**170.00**
★ Visitrend/Visiplot		**300.00**	**230.00**
Visidex		250.00	**212.50**
Visiterm		100.00	**85.00**
★ Visicalc 3.3		**250.00**	**193.75**
Visifile		250.00	**212.50**

SENSIBLE

Super Disk Copy III		30.00	**25.50**
Multi-Disk Catalog		25.00	**21.25**
★ Sensible Speller		**125.00**	**93.75**
Image Printer	NEW	40.00	**34.00**

SIR-TECH

★ Wizardry		**49.95**	**37.45**
Knight of Diamonds		34.95	**29.70**

SOFTWARE PUBLISHING

PFS		125.00	**106.25**
PFS: Report		95.00	**80.75**
★ PFS: Graph	**NEW**	**125.00**	**93.75**

STONEWARE

DB Master		229.00	**195.45**
★ DB Master Utility Pak #1		**99.00**	**74.25**
DB Master Utility Pak #2		99.00	**84.15**
DB Master Stat Pak		99.00	**84.15**
Graphics Processing System		59.95	**50.95**

SIRIUS SOFTWARE

		Retail Price	Our Price
Gorgon		39.95	**33.95**
Sneakers		29.95	**25.45**
★ Epoch		**34.95**	**26.20**
Copts & Robbers		34.95	**29.70**
Beer Run		29.95	**25.45**
Hadron		34.95	**29.70**
The Joyport		74.95	**63.70**
★ Twerps		**29.95**	**22.45**
Snake Byte		29.95	**25.45**
Audex		29.95	**25.45**
Kabul Spy		34.95	**29.70**
Minotaur		34.95	**29.70**
★ Bandits		**34.95**	**26.20**
Escape from Rungistan	NEW	29.95	**25.45**
Lemmings	NEW	29.95	**25.45**
Jellyfish	NEW	29.95	**25.45**
Cyclod	NEW	29.95	**25.45**
Fly Wars	NEW	29.95	**25.45**

STRATEGIC SIMULATIONS

Cartels & Cutthroats		39.95	**33.95**
Computer Quarterback (2nd Ed.)		39.95	**33.95**
The Shattered Alliance		59.95	**50.95**
Computer Baseball		39.95	**33.95**
★ Operation Apocalypse		**59.95**	**44.95**
Southern Command		59.95	**50.95**
★ Napoleon's Campaigns		**59.95**	**44.95**
Road to Gettysburg		59.95	**50.95**
★ Pursuit of the Graf Spee		**59.95**	**44.95**
Guadalcanal Campaign	NEW	59.95	**50.95**
Cytron Masters	NEW	39.95	**33.95**
Galactic Gladiators	NEW	39.95	**33.95**
SEUIS	NEW	39.95	**33.95**
The Cosmic Balance	NEW	39.95	**33.95**

TG PRODUCTS

Game Paddles		39.95	**33.95**
Joystick		59.95	**50.95**
★ Select-a-Port		**59.95**	**44.95**

We also carry complete lines from the following companies:

ADVENTURE INTERNATIONAL
ARTSCI • ASHTON-TATE
AUTOMATED • BEAGLE
BUDGECO • CAL PACIFIC
HOWARD • INNOVATIVE
MICROLAB • MICROPRO
PENGUIN • PHOENIX
PICCADILLY • QUALITY
SENTIENT • SIERRA
SOUTHEASTERN • SUBLOGIC
SOUTHWESTERN • VIDEX
SYNERGISTIC • SYSTEMS PLUS

If you don't see it, Ask Us!

CALSOFT

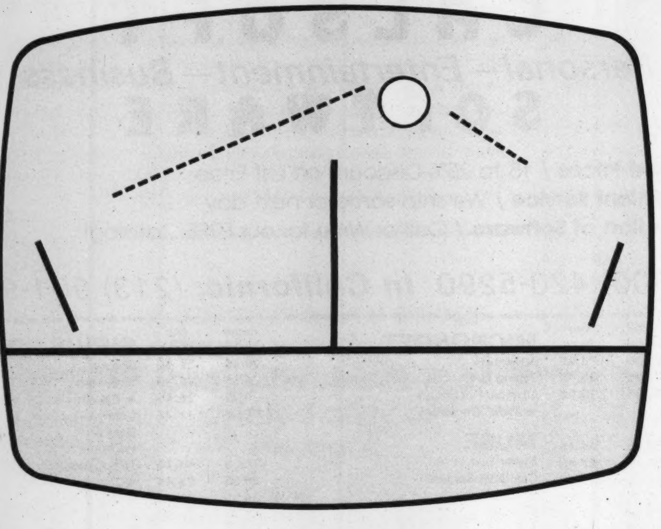
346 N. Kanan Rd. #103
Agoura, CA 91301

***Call Toll Free:** (800) 423-5290 **In California:** (213) 991-9641*

We accept Mastercard & Visa (include # and Expiration Date), check, COD ($1.50 extra), or Money Order. California residents add 6% sales tax. Include $2.00 for shipping (UPS Blue Label $3.00, Canada $6.00, other foreign countries $10.00).

★ Sale prices are through October only! Prices subject to change without notice.

CIRCLE 127 ON READER SERVICE CARD



Who Really Invented the Video Game?

John Anderson

The Space Age had just been birthed. Sputnik was a new and somewhat ominous presence in the evening sky—my father tells me he carried me to the roof of our apartment building to see it. I don't remember. The year was 1958, and I was two years old.

Dave Ahl, my boss, was a high school student. He had won a scholarship, one benefit of which was a tour of Brookhaven National Laboratory in Upton, NY. Something he saw on an oscilloscope there remained fixed in his mind for many years, and caused, among other things, a recent pilgrimage of my own.

Nearly 25 years after the fact, I found myself on the Long Island Expressway. I was trying to pass an eighteen-wheeler spewing gravel off its trailer, while I looked for the Brookhaven exit. It occurred to me that the Lab was hardly a stone's throw from Shoreham Nuclear Power Station, that controversial patch of multibillion-dollar poured concrete. I wondered if the proximity was mere coincidence.

Brookhaven is a government installation, and I get nervous at checkpoints. The guard at the gate had a familiar kind of hypertensive bearing. I wished then I had shaved that morning. I proffered my press card with clammy claw. He told me to pull my car off to the side; I knew the jig was up. I was a spy, an agent, a saboteur, and it was all over.

He handed me a piece of paper and said those chilling words: "Have a nice day." Upon inspection, the paper seemed to be a visitor's map. My adrenalin level began to subside.

It's really very simple to get to the Department of Nuclear Energy. You make a right near the linear accelerator, and pull into the lot next to the alternating gradient synchotron. If you see the tandem Van de Graff, you've gone too far.

From there, only one flight of stairs separates you from one of the great, unsung heroes of our time, Willy Higinbotham.

There was Bell, there was Edison, there was Fermi. And then there was Higinbotham.

Willy was responsible for the display Dave saw on that fateful day in 1958. Willy, you see, invented the video game.

> **There was Bell, there was Edison, there was Fermi. And then there was Higinbotham.**

We've received several manuscripts which attempt to set the record straight on the history of the video game. If you claim and can document a video game predating 1958, let us know.

Otherwise, give Willy Higinbotham his profound and historic due. Much to the chagrin of large corporations involved in current litigation, he did it first, and he has proved it.

Though he stands about five feet four inches tall, Mr. Higinbotham commands quite a stature. He very nearly chain-smokes unfiltered cigarettes, which he wolfs down with great voracity for a man of 72 years. His eyeglasses magnify to the point where his corneas seem as large as quarters. He laughs easily and likes to play the accordian, though he admits it's been a while since he's played at a party.

And, as a physicist in the Manhattan Project, he witnessed the detonation of the first atomic bomb.

Before we sat down to speak in earnest, Willy called an old friend, Dave Potter, and asked him to join us. Dave had worked with Willy on the original game designs. We adjourned to a conference room. As Willy got started, other scientists would wander into the room, find a perch, and listen along. "Isn't he something?" one of the scientists whispered as an aside. He sure is.

Back in the 1950's, when tours of the Laboratory were first instituted, they were rather static affairs, usually consisting of a group of photographs to depict some facet of research at the facility. Willy, who discovered his penchant for physics at Cornell and electronics at MIT, explained that he wanted to make his display more dynamic. Give it a little punch. Wouldn't it fill the bill, he thought, if we got some sort of little game going on a CRT, so visitors could have some "hands-on" interaction with the hardware? He and his associates fashioned a tennis game, played on the five-inch screen of an oscilloscope.

Digital computers were coming into their own in 1958; in fact, Willy's own

DDP

DISCOUNT DATA PRODUCTS

FOR THE BEST SERVICE
AND PRICE YOUR $ CAN BUY

30% DISCOUNT ‡ MONTHLY SPECIALS

GAMES ★ UTILITIES ★ BUSINESS

APPLE

		LIST PRICE	OUR PRICE
★ ADVENTURE INTERNATIONAL			
★ APPLIED SOFTWARE			
★ ASTAR INTERNATIONAL COMPANY			
★ ASHTON TATE			
ARTSCI			
Magic Window	D	99.95	79.95
Magic Mailer	D	69.95	
ARTSCI			
Magic Window	D	99.95	79.95
Magic Mailer	D	69.95	55.95
Magic Words	D	69.95	**48.95‡**
★ AUTOMATED SIMULATIONS			
★ AVALON HILL GAME COMPANY			
AVANT-GARDE CREATIONS			
Hi-Res Secrets	D	125.95	**87.95‡**
Hi-Res Golf	D	29.95	23.95
BEAGLE BROTHERS			
DOS Boss	D	24.00	19.95
Utility City	D	29.50	**23.60‡**
Apple Mechanic	D	29.95	23.95
★ BEZ			
BRODERBUND SOFTWARE			
Star Blazor	D	31.95	**22.39‡**
David's Midnight Magic	D	34.95	27.95
Arcade Machine	D	44.95	35.95
Choplifter	D	34.95	27.95
BUDGECO			
Raster Blaster	D	29.95	23.95
CALIFORNIA PACIFIC			
3D Graphics	D	39.95	31.95
Ultima	D	39.95	31.95
CAVALIER COMPUTER			
Bug Attack	D	29.95	23.95
Micro Wave	D	34.95	27.95
★ CONTEXT ★ C.P.U.			
CONTINENTAL SOFTWARE			
Home Accountant	D	74.95	59.95
1st Class Mail	D	74.95	59.95
★ COMPUTER STATION			
DANKIN 5/LEVEL 10			
Programming Aids	D	90.00	71.95
DATAMOST			
County Fair	D	29.95	**20.95‡**
Thief	D	29.95	23.95
Casino	D	39.95	31.95
Swashbuckler	D	34.95	27.95
Snack Attack	D	29.95	23.95
★ DATASOFT ★ DELTA SOFTWARE			
DENVER SOFTWARE			
Pascal Tutor	D	125.00	99.95
Pascal Programmer	D	125.00	99.95
★ EDU-WARE			
GEBELLI SOFTWARE			
Horizon V	D	34.95	27.95
Russki Duck	D	34.95	27.95
Zenith	D	34.95	27.95
HAYDEN SOFTWARE			
Sargon II	D	34.95	27.95
★ HIGHLANDS COMPUTER SERVICES			
★ HOWARD SOFTWARE			

		LIST PRICE	OUR PRICE
★ INNOVATIVE DESIGN SOFTWARE			
INFOCOM			
Zork I	D	39.95	31.95
Zork II	D	39.95	33.95
Deadline	D	49.95	39.95
I.S.M.			
Mathemagic	D	89.95	71.95
INSOFT			
Graforth II	D	79.95	55.95
★ ISA ★ IUS ★ L&S ★ LINK			
★ LJK ENTERPRISES			
MICRO LAB			
Peeping Tom	D	34.95	27.95
Data Factory 5.0	D	300.00	239.95
★ MICRO PRO INTERNATIONAL			
MICROSOFT			
TASC Compiler	D	175.00	**122.50‡**
A.L.D.S.	D	125.00	99.95
Olympic Decathlon	D	29.95	23.95
Typing Tutor II	D	24.95	19.95
MUSE			
Voice	D	39.95	31.95
Castle Wolfenstein	D	29.95	23.95
ON-LINE SYSTEMS			
Ultima II	D	59.95	47.95
Frogger	D	34.95	27.95
#2 Wizard & Princess	D	32.95	26.35
#3 Cranston Manor	D	34.95	27.95
#4 Ulysess & Golden Fleece	D	39.95	27.95
Screen Writer II	D	129.95	99.95
Expeditor II AppleSoft Com	D	99.95	79.95
Jawbreaker	D	29.95	23.95
Marauder	D	34.95	27.95
Time Zone	D	99.95	79.95
Threshold	D	39.95	31.95
Cannonball Blitz	D	34.95	27.95
Softport Adv. (X-Rated)	D	29.95	23.95
Mouseattack	D	39.95	31.95
PENGUIN SOFTWARE			
Complete Graphics System II (Joystick-paddles)	D	69.95	55.95
Special Effects (Joystick-paddles)	D	39.95	31.95
Graphics Magician	D	59.95	47.95
PERSONAL BUSINESS SYSTEM			
Exec. Secretary	D	250.00	199.95
PICCADILLY			
Falcons	D	29.95	23.95
★ PROFESSIONAL SOFTWARE			
★ PROGRAM DESIGN			
★ PHOENIX SOFTWARE			
★ QUALITY SOFTWARE			
★ RIVERBANK SOFTWARE			
SENSIBLE SOFTWARE			
Multi Disk cata III	D	25.00	19.95
Disk Recovery	D	30.00	23.95
Applesoft-Plus	D	25.00	19.95
Applesoft Pro. Opt	D	20.00	15.95
Disk Org. II	D	30.00	**20.90‡**
Quickloader	D	25.00	19.95
Sensible speller (NEW)	D	125.95	99.95
Image Printer (specify)		40.00	31.95

		LIST PRICE	OUR PRICE
★ SIERRA SOFTWARE			
SIRIUS SOFTWARE			
Audex	D	29.95	23.95
Sneakers	D	29.95	23.95
Borg	D	29.95	23.95
Joyport	A	74.95	59.95
Gorgon	D	39.95	**27.95‡**
SIR-TECH SOFTWARE			
Wizardy	D	49.95	39.95
Knight of Diamonds	D	34.95	27.95
★ SOFTAPE ★ SOFTWARE EMPORIUM			
SOFTWARE PUBLISHING CORP.			
PFS	D	125.00	99.95
PFS Report	D	95.00	71.95
PFS: Graph	D	125.00	99.95
SOUTHEASTERN			
Data Capture	D	64.95	52.95
Data Capture 80 Col.	D	90.00	69.95
Specify: Videx Smarterm Superterm			
SOUTHWESTERN DATA SYSTEMS			
Ascii Pro	D	129.95	103.95
Doubletime Printer	D	149.95	119.95
Printographer	D	49.95	39.95
Correspondent	D	59.95	47.95
Merlin	D	64.95	51.95
The Routine Machine	D	64.95	51.95
Z-Term "The Pro"	D	150.00	119.95
P-Term	D	129.95	103.95
Norad	D	39.95	**27.95‡**
Munch-A-Bug	D	49.95	39.95
STONEWARE PRODUCTS			
D.B. Master	D	229.00	182.95
D.B. Mas. Utly. Pak I	D	99.00	79.95
D.B. Mas. Utly. Pak 2	D	99.00	78.95
D.B. Master Stat Pak	D	99.00	78.95
★ STRATEGIC SIMULATIONS ★ STC			
SUBLOGIC			
Pinball	D	29.95	25.95
Graph. Combo Pkg.	D	119.85	99.95
★ SOFTECH ★ SORCIM			
★ SYNERGISTIC SOFTWARE			
TG PRODUCTS			
Game Paddles	A	39.95	**27.95‡**
Joystick	A	59.95	47.95
Select A Port	A	59.95	47.95
★ TURNKEY SOFTWARE			
VISICORP			
Visitrend/Plot	D	300.00	229.95
Visicalc	D	250.00	187.50
Visifile	D	250.00	199.95
Visiterm	D	100.00	79.95
Visiplot	D	200.00	159.95
★ VERSA COMPUTING			
★ UNITED SOFTWARE OF AMERICA			
★ VIDEX INC. ★ VOYAGER SOFTWARE			

**LARGE SELECTION OF
ATARI AND
TRS 80 SOFTWARE**

CALL TOLL FREE 1-800-854-2914 (FOR PLACING ORDERS OUTSIDE CALIFORNIA)

FOR INSIDE CALIFORNIA AND OTHER INQUIRIES CALL 1-714-287-0190

★ SEND FOR OUR FREE PRICE SHEET FOR SPECIFIC PROGRAMS AND PRICES

PLEASE CHECK FOR SYSTEM REQUIREMENTS BEFORE ORDERING. INCLUDE PUBLISHER AND PRODUCT NAME

FOREIGN INQUIRIES INVITED — ADD 10% SHIPPING

All Orders Prepaid by Personal Check, Money Order, Cashier Check. For Faster Delivery Service — Master Charge — Visa

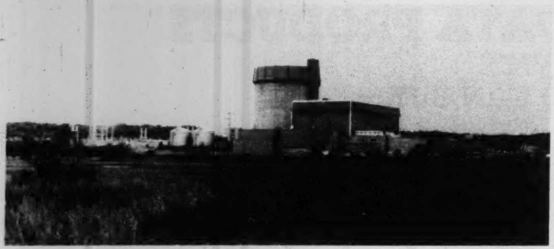
Mastercharge — Visa add 3%, and include expiration date on card. Please Add $2.50 for Shipping.

California Residents Add 6% Sales Tax. Prices Valid Through This Month's Issue.

Prices Subject to Change Without Notice

DISCOUNT DATA PRODUCTS • P.O. BOX 19674-CI • SAN DIEGO, CALIFORNIA 92119

CIRCLE 156 ON READER SERVICE CARD



A few miles up the road, Shoreham Nuclear Power Station.

BROOKHAVEN
NATIONAL
LABORATORY
DEPARTMENT OF ENERGY

This must be the place.

Instrumentation Division was building one at the time. However his game contraption made use of an analog computer, one that used variable voltages rather than on-off pulses to represent information. To this was hardwired a nonprogrammable assemblage of electromechanical relays, potentiometers, resistors, capacitors, and "op-amps," short for operational amplifiers.

Willy himself is the first to admit that the arrangement was rather inelegant. But he also points out that it worked. He did make use of some recently invented transistors as flip-flop switches—a harbinger of things to come. Willy simply did the job in the shortest time with whatever parts were handy. The result was a video game, something no computer, digital or analog, had been harnessed to do before.

The screen display was a side view of a tennis court. It looked like an upside-down "T," with a shortened stem. This was the "net." Each player held a prototypical paddle, a small box with a knob and button on it. The knob controlled the angle of the player's return, and the button chose the moment of the hit. A player could hit the ball at any time, providing it was on his side of the net. Gravity, windspeed, and bounce were all portrayed. For example, if you hit a ball into the net, it would bounce lower than a bounce off the "ground," and would eventually die.

The game was simple, but fun to play, and its charm was infectious. Potter remembers the popularity of the game: "The high schoolers liked it best. You couldn't pull them away from it." He's probably remembering young Dave Ahl, staring at the screen with a little voice inside him saying "this could be important."

The ball and court lines were drawn and redrawn sequentially, at a rate that made for a flicker-free view of ground, net, and ball. This is an approach still used in game playfield display. However the method of ball manipulation was and remains unique.

The game was simple, but fun to play, and its charm was infectious.

Without becoming too bogged down in explanation, consider the following. An oscilloscope is capable of generating cartesian coordinate displays. That is to say, a dynamic "graph" can be drawn, plotting the deflection of x or y proportionally to the voltages input as x or y.

Higinbotham rigged up a circuit wherein the plot of these functions simulated the trajectory of a bouncing ball. Op-amps from a Donner Labs analog computer were used to generate this trajectory and to sense when the ball had struck the ground. When this occurred, a relay would be thrown, reversing the polarity of another op-amp, so that the ball would reflect its path and "take a bounce." Primitive, but effective.

Other op-amps and relays were used to determine whether or not the ball had hit the net. As mentioned earlier, rebound velocity from the net was lower than from the ground, providing an extra bit of realism.

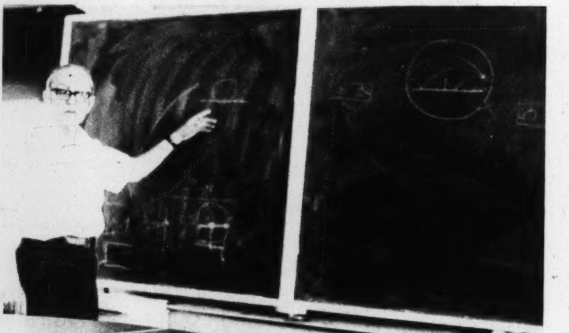
Velocity, slowed continually by windspeed, was simulated straightforwardly with a 10 meg. resistor.

A toggle switch allowed players to choose which side to serve from, and net height, as well as court length, were adjustable. There was no way a player could "miss" the ball, as a push of the paddle button would always result in a hit when the ball was on that player's side of the net. Unless the player chose the correct angle and timing for a return, however, the shot would not make it back to the opponent's side.

The implementation was very much more sophisticated than the first "Pong" games. It was the hit of the Brookhaven "visitors' days" for two years running. Eventually, however, it was dismantled.

I asked Willy why he hadn't patented the thing at the time. He is responsible for over 20 patents, each of which reverted to the U.S. Government.

Dave Potter (left) and Willy worked on the original design.



Willy describes the innards of his electronic tennis game. His rendering of the screen appears at right.

HAYDEN • IUS • MICROPRO • MUSE • ON-LINE • SENSIBLE • SIRIUS • SYNERGISTIC • MICRO SCI •

COMPUTER SPECIALTIES

ORDER TOLL-FREE! 1-800-854-2833

FREE* SHIPPING

(with prepaid cash orders)

COMMODORE 64

CALL FOR BEST PRICE

The Commodore 64 is a compact unit (will fit into briefcase). Full size typewriter keyboard, high res. color, this computer is the major breakthru you've been waiting for.

- **64K Built in RAM** • **CP/M option**
- **Upper/lower case** • **Graphics characters**
- **TV interface** • **Music synthesizer**
- **40 col. color display** • **"Smart" peripherals**
- **Cartridge game slot**

The Commodore 64 can use the VIC or CBM/Pet Accessories.

ULTIMAX — SUPER VIC

ORDER NOW!

VIC 20

$239

HARDWARE

Dataset	64
Disk Drive	489
Graphic Printer	329
8K Mem. Expander	49
16K Mem. Expander	98
24K Mem. Expander	179
Mini-Mother (3-slot)	59
RS232C Term. Int.	43
IEEE-488 Int.	84
Super Expander	49
Programers Aid Cart.	44
Vicmon	43
Pro. Ref. Guide	14
Intor to Basic Pro.	18
Victerm	8
Pro. Char. Set/Game Ed.	11
Joystick/Paddles	19
Light Pen by Simtec	129
Modem	89
Monitor Cables	12
Prom Simulator	199
80 Col. Card	179
Epson Mx70 for Vic	CALL

CALL FOR CATALOG

SOFTWARE ON CARTRIDGE

Spiders of Mars	36
Robot Blasters	30
Meteor Run	36
Sattelites & Meteors	36
Amok	29
Alien Blitz	29
Renaissance (Othello)	36
Alien	19
Cosmic Kamakazi	19
Vic Avengers	21
Super Slot	21
Super Alien	19
Super Lander	21
Draw Poker	20
Midnight Drive	21

ON TAPE

ViCalc*	11
ViCheck*	18
ViCat*	18
Amok	14
Alien Blitz	18
Sky Math*	11
Space Div*	11
Car Costs (2 on 1)	12
B-1 Nuclear Bomber	12
Nuke War	13
Planet Miners	12
Lords of Karma	15
Vic Games (3 on 1)	19
Hsehold Fin. Pack	26
Home Inventory	12
Rec/Ed Pack I	12
Rec/Ed Pack II	12

*Needs 3K
**Needs 8K

Complete Catalog of VIC .... CALL

ATARI* 800 16K $669

Atari 400 w/16K	319
410 Recorder	79
810 Disk Drive	439
850 Interface	159
Full-View 80	279
32K by Microtek	139
Light Pen by Symtek	129

We offer a huge selection of software (the latest) and hardware (the greatest). Call toll free and receive our full product catalog just for your Atari!

apple PLUS 48K

FOURTH DISK DRIVE WITH CONTROLLER

$1758

ACCESSORIES

Fourth Drive (100% Compatable)	389
Fourth Drive w/Controller	479
Rana Disk Drives	CALL
Micro Sci	CALL
Vista 8" Drive	CALL
16K Ram (2 yr. war.)	69
AIO II	189
CCS Asynch 7710A	129
CPS Multi Func. by Mtn.	185
Metacd by Metamorphic	895
Micromodem II	278
Enhancer II	124
Microbuffer II	CALL
32K by Saturn	199
Num. Keypad (23 key)	119
Sup R Mod	35
Sooper Spooler	CALL
Z-80 by Microsoft	249
Videoterm (80 Col.)	259
Signalman Modem	79
Howard Soft	CALL
Bus. Pks. by Cont.	199 ea.
DB Master	169
Screen Writer II	99
TASC by Microsoft	159
Logo	CALL
Synergy Card by Spies	169
Visifile	199
Visicalc 3.3	189
Visidex	189
Visi Schedule	239
Visitrend/Plot	189
Time Manager	124
Pie Writer	119
Magic Window	88
Peachtree	CALL
Gen. Mge. by On Line	CALL
Parallel Card	69
Z-Card	189
RGB Card	159
Versa Card	169
The Grappler	124
Versa Writer	209
8" Controller by SVA	199
Joystick by TG	46
Infone	CALL
The Mill	319
Lower Case	29
Expan. Chassis by Mtn.	559
HARD DISK	CALL
APPLI-CARD	CALL
Sup. Color Board — Elect. Home	CALL
Entertainment Business	CP/M

FAST SERVIC

SOFTWARE

Alkemstone	34
Castle Wolfenstein	24
Gorgon	35
Time Zone	79
Soft Porn	29
Bug Attack	24
Dead Line	39
Cyclod	24
Word Star	199
Basic 80	284
Basic Compiler	299
Calc Star	166
Mail Merge	79
Spellstar	159
T/Maker	229
CP/M Catalog	FREE!

CALL FOR NEWEST SELECTION

NEW

Franklin Ace 100	CALL
Basis 108-The Alternative	CALL

*APPLE IS A REGISTERED TRADEMARK

commodore

CBM 8032 $1038

CBM 8096	1459
PET 4016	749
PET 4032	959
Super PET 9000	1495
4022 Dot Matrix Printer	589
4040 Dual Disk Drives	939
8050 Dual Disk Drives (1 Meg.)	1299
2031 Single Disk Drive	499
8300P Letter Quality Printer	1699

"A computer may as well be an anchor without software". Call for a complete catalog of software (and hardware) for the CBM or PET computer.

PRINTERS & MONITORS

PRINTERS

Epson (free stand 1st week this month) CALL

NEC • OKIDATA • ANADEX •
C-ITOH • IDS PRISM • ALL BRANDS

MONITORS

AMDEK COLOR I AND COLOR II

DATA ED HI RES COLOR .... **CALL**

If your needs are for a letter quality or matrix printer, or your system requires an RGB color or green screen monitor — you'll find a great selection in our catalog of "Printers and Monitors". Call 1-800-854-2833 it's FREE!

FREE CATALOG

IBM®

ACCESSORIES

Clock/Cal by Apparat	109
Combo Cd by Apparat	239
64K Combo by AST	469
128K Combo by AST	639
192K Combo by AST	799
256K Combo by AST	979
64K Mem by AST	335
128K Mem by AST	499
192K Mem by AST	669
256K Mem by AST	799
512K (w/Serial) by CI	995
Hard Disk by Davong	1650
64K by Macrolink	369
128K by Macrolink	519
192K by Macrolink	659
256K by Macrolink	729
Quadboard 64K	495
Quadboard 256K	795
Parallel Card	129
Time Clock	129
Baby Blue by Xedex	599
64K + by Seattle	389
128K + by Seattle	539
192K + by Seattle	689
256K + by Seattle	799
Amdek Color II	769
Percom Drives	CALL
Smart Modem*	209
Microsoft	CALL

SOFTWARE

Volks Writer	159
Basic-80 by Microsoft	295
Basic Compiler	349
Easy by Denver	CALL
Visicalc (256K)	199
The Programmer	369
Supercalc	219
Home Accting Plus	129
Super Writer by Sorcim	289
Mathemagic	69

*For a complete catalog of software, languages, and utilities for your IBM personal computer ... **please call 1-800-854-2833.***

NEC PC-8001A 32K

CALL

NEC PRINTER
PC-8001 A
NEC I/O Unit
NEC add on Dual Drive
NEC Green Screen

Call For
Total System
Price and . . .
SAVE!!!

Call for Bill Jones and ask Bill for a free NEC catalog . . . and the lowest prices possible.

Hewlett – Packard

CALL FOR ALL

TO ORDER: Phone orders invited using Visa, Mastercard or bank wire transfers. Visa and MC service charge of 2%. Mail orders may send charge card number (include expiration date), cashiers check, money order, or personal check (allow 10 business days for personal or company checks to clear). Please add 3% ($5.00 minimum) for UPS shipping, handling, and insurance. APO and FPO include 5% ($7.00 minimum) for postage. Calif. residents add 6% sales tax. Please include phone number on all orders. FOREIGN ORDERS include 1% handling — shipped air FREIGHT COLLECT only. Credit cards not accepted on foreign orders. All equipment is in factory cartons with manufacturer warranty. Opened products not returnable. Restocking fee for returned merchandise. Equipment subject to price change and availability. Retail prices differ from mail order prices. WE SHIP THE SAME DAY ON MOST ORDERS!

*Exclude certain printers & monitors & foreign orders.

COMPUTER SPECIALTIES

(714) 579-0330
MAIL TO: 1251 BROADWAY
EL CAJON, CA. 92021

VIDEX • ADVENTURE INT'L • ASHTON TATE • BEAGLE BROS. • BRODER BUND • CONTINENTAL • EDU-WARE • DIGITAL RESEARCH •

APPLE • NEC • ATARI • IBM •

CIRCLE 142 ON READER SERVICE CARD

C-ITOH • EPSON • RANA • HAYES •

ACTIVISION • DATA-ED • MICROSOFT • MOUNTAIN • OKIDATA • IDS • ZENITH • ALTOS • AMDEK • ANADEX • DIABLO • TELEVIDEO •

Our yellow pages make the competition go green.

There's no recession at Alpha Byte. Our business is booming.

In the past year alone, our sales have increased ten-fold. And they're still on the rise.

We believe it's because we offer a unique combination of low prices and outstanding service — a package of knowledgeable salespeople, quick and efficient shipping, convenient payment options and a guarantee of satisfaction — at below-competitive prices!

Our satisfied customers are spreading the word.

We built a reputation, and a booming business, on our prices and your satisfaction. It's no wonder the competition is envious.

16K RAM KITS....13.95

Set of 8 NEC 4116 200 ns. Guaranteed one full year.

DISKETTES

ALPHA DISKS..........21.95

Single sided, certified Double Density 40 Tracks, with Hub-ring. Box of 10. Guaranteed one full year.

VERBATIM DATALIFE

MD 525-01, 10, 16	26.50
MD 550-01, 10, 16	44.50
MD 557-01, 10, 16	45.60
MD 577-01, 10, 16	34.80
FD 32 or 34-9000	36.00
FD 32 or 34-8000	45.60
FD 34-4001	48.60

DISKETTE STORAGE

5¼'' PLASTIC LIBRARY CASE	2.50
8'' PLASTIC LIBRARY CASE	3.50
PLASTIC STORAGE BINDER w/ Inserts	9.95
PROTECTOR 5¼'' (50 Disk Capacity)	21.95
PROTECTOR 8'' (50 Disk Capacity)	24.95
DISK BANK 5¼''	5.95
DISK BANK 8''	6.95

NEC PERSONAL COMPUTERS

PC-8001A CPU	899.00
PC-8012A I/O	559.00
PC-8033A DISK I/O	125.00
PC-8031A DUAL DISK	899.00

ALTOS COMPUTER SYSTEMS

Call Alpha Byte for our low Altos prices.

ATARI COMPUTERS

ATARI 800	679.00
ATARI 400 (16K)	$CALL
ATARI 810 DISK DRIVE	445.00
ATARI 850 INTERFACE	169.00
ATARI 410 PROGRAM RECORDER	75.00
EPSON CABLE	35.00
MEMORY MODULE (16K)	89.95
JOYSTICK CONTROLLER	10.00
PADDLE CONTROLLERS	19.95
STAR RAIDERS	35.00
MISSILE COMMAND	35.00
ASTEROIDS	35.00
PACMAN	35.00

INTEC PERIPHERALS RAM MODULES

48K FOR ATARI 400	279.00
32K FOR ATARI 800	125.00

ACTIVISION ATARI CARTRIDGES

LAZAR BLAST	21.95
SKIING	21.95
DRAGSTER	21.95
BOXING	21.95
CHECKERS	21.95
BRIDGE	21.95
KABOOM	21.95

HEWLETT PACKARD

HP CALCULATORS

HP-11C LCD SCIENTIFIC	115.95
HP-12C LCD BUSINESS	128.95
HP-37E BUSINESS	64.95
HP-32E SCIENTIFIC w/ STATS	46.95
HP-33C Programmable Scientific	76.95
HP-41C Advanced Programmable	211.95
HP-41CV Advanced Prog 2K mem	274.95

HP-41 PERIPHERALS

HP-82106A MEMORY MODULE	27.95
HP-82170A Quad Memory Module	89.00
HP-82143A PRINTER/PLOTTER	324.95
HP-82160A IL INTERFACE	119.00
HP-82161A DIGITAL CASSETTE	419.00
HP MATH PAC	29.00
HP STATISTICS PAC	29.00
HP REAL ESTATE PAC	39.00
HP SURVEYING PAC	29.00
HP STRUCTURAL ANALYSIS PAC	39.00

HP COMPUTERS

HP-85A PERSONAL COMPUTER	2195.00
HP SINGLE 5¼''DISK DRIVE	1295.00
HP DUAL DISK DRIVE	1995.00
HP-85A 16K MEMORY MODULE	239.00
HP-7225B GRAPHICS PLOTTER	2195.00
HP PLOTER MODULE	605.00
HP HP-IB INTERFACE	329.00
HP STD APPLICATIONS PAC	83.00
HP GENERAL STATISTICS PAC	83.00
HP GRAPHIC PRESENTATIONS	159.00
HP VISICALC PLUS	159.00
HP ROM DRAWER	39.00
HP PRINTER/PLOTTER ROM	116.00
HP MASS STORAGE ROM	116.00
HP RS-232 INTERFACE	329.00

PRINTERS

ANADEX DP 9500	1295.00
ANADEX DP 9501	1295.00
C-ITOH F-10 40 CPS PARALLEL	1545.00
C-ITOH 45 CPS PARALLEL	1770.00
C-ITOH 40 CPS SERIAL	1295.00
C-ITOH PROWRITER PARALLEL	549.00
C-ITOH PROWRITER SERIAL	695.00
EPSON MX-80 W/GRAFTRAX PLUS	$CALL
EPSON MX-80 F/T W/GRAFTRAX PLUS	$CALL
EPSON MX-100 W/GRAPHTRAX PLUS	$CALL
EPSON GRAFTRAX PLUS	60.00
IDS PRISM 80 W/O COLOR	1099.00
IDS PRISM 80 W/COLOR	1599.00
IDS PRISM 132 W/COLOR	1799.00
NEC 8023A	485.00
NEC SPINWRITER 3530 P. RO	1995.00
NEC SPINWRITER 7710 S. RO	2545.00
NEC SPINWRITER 7730 P. RO	2545.00
NEC SPINWRITER 7700 D SELLUM	2795.00
NEC SPINWRITER 3500 SELLUM	2295.00
OKIDATA MICROLINE 80	389.00
OKIDATA MICROLINE 82A	469.00
OKIDATA MICROLINE 83A	720.00
OKIDATA MICROLINE 84	1199.00
OKIGRAPH 82	33.95
OKIGRAPH 83	33.95

APPLE HARDWARE

VERSA WRITER DIGITIZER	259.00
ABT APPLE KEYPAD	119.00
SOFTCARD PREMIUM SYSTEM	625.00
MICROSOFT Z-80 SOFTCARD	299.00
MICROSOFT RAMCARD	159.00
VIDEX 80 x 24 VIDEO CARD	299.00
VIDEX KEYBOARD ENHANCER II	129.00
VIDEX ENHANCER REV 0-6	99.00
M & R SUPERTERM 80 x 24 VIDEO BD	315.00
SSM AIO BOARD (INTERFACE) A & T	165.00
SSM AIO BOARD (INTERFACE) KIT	135.00
APPLE COOLING FAN	44.95
T/G JOYSTICK	44.95
T/G PADDLE	29.95
T/G SELECT-A-PORT	54.95
VERSA E-Z PORT	21.95
MICRO SCI A2 W/CONTROLLER	510.00
MICRO SCI A2 W/O CONTROLLER	419.00
MICRO SCI A40 W/CONTROLLER	479.00
MICRO SCI A40 W/O CONTROLLER	409.00
MICRO SCI A70 W/CONTROLLER	629.00
MICRO SCI A70 W/O CONTROLLER	549.00
THE MILL-PASCAL SPEED UP	270.00
PROMETHEUS VERSACARD	180.00
LAZAR LOWER CASE +	59.00
MICROBUFFER II 16K W/GRAPHICS	259.00
MICROBUFFER II 32K W/GRAPHICS	299.00

MONITORS

NEC 12'' GREEN MONITOR	179.00
NEC 12'' COLOR MONITOR	399.00
SANYO 12'' MONITOR (B & W)	249.00
SANYO 12'' MONITOR (GREEN)	269.00
SANYO 13'' COLOR MONITOR	469.00
ZENITH 12'' HI RES GREEN MONITOR	124.00
AMDEK COLOR I	389.00
AMDEK RGB COLOR II	859.00
AMDEK RGB INTERFACE	169.00
COMREX 12'' GREEN MONITOR	165.00

MOUNTAIN HARDWARE

CPS MULTIFUNCTION BOARD	199.00
ROMPLUS W/ KEYBOARD FILTER	179.00
ROMPLUS W/O KEYBOARD FILTER	130.00
KEYBOARD FILTER ROM	49.00
COPYROM	49.00
MUSIC SYSTEM	369.00
ROMWRITER	149.00
APPLE CLOCK	252.00
A/D + D/A	299.00
EXPANSION CHASSIS	625.00
RAMPLUS 32K	149.00

CORVUS

FOR S-100, APPLE OR TRS-80 MOD I, III

Controller, Case/P.S., Operating System, A & T.

5 MEGABYTES	3245.00
10 MEGABYTES	4645.00
20 MEGABYTES	5545.00
MIRROR BACK-UP	725.00

CALIF. COMPUTER SYSTEMS

S-100 BOARDS

2200A MAINFRAME	459.00
2065C 64K DYNAMIC RAM	539.00
2422 FLOPPY DISK CONT. & CP/M®	359.00
2710 FOUR SERIAL I/O	279.00
2718 TWO SERIAL/TWO PARALLEL I/O	269.00
2720 FOUR PARALLEL I/O	199.00
2810 Z-80 CPU	259.00

APPLE BOARDS

7710A ASYNCHRONOUS S. INTERFACE	149.00
7712A SYNCHRONOUS S. INTERFACE	159.00
7424A CALENDAR CLOCK	99.00
7728A CENTRONICS INTERFACE	105.00

VISTA COMPUTER CO.

APPLE VISION 80-80 COL CARD	329.00
APPLE 8'' DISK DRIVE CONTROLLER	549.00

MODEMS

NOVATION CAT ACOUSTIC MODEM	135.00
NOVATION D-CAT DIRECT CONNECT	156.00
NOVATION AUTO-CAT AUTO ANS	219.00
NOVATION APPLE-CAT	325.00
UDS 103 LP DIRECT CONNECT	175.00
UDS 103 JLP AUTO ANS	209.00
HAYES MICROMODEM II (APPLE)	289.00
HAYES 100 MODEM (S-100)	325.00
HAYES SMART MODEM (RS-232)	227.00
HAYES CHRONOGRAPH	199.00
LEXICON LEX-11 MODEM	109.00

TERMINALS

TELEVIDEO 910	639.00
TELEVIDEO 912C	745.00
TELEVIDEO 920C	830.00
TELEVIDEO 950C	995.00
ADDS-VIEWPOINT	599.00

TRS-80 MOD I HARDWARE

PERCOM DATA SEPARATOR	27.00
PERCOM DOUBLER II	159.00
TANDON 80 TRACK DISK DRIVE	345.00
TANDON 40 TRACK DISK DRIVE	289.00
LNW DOUBLER W/ DOSPLUS 3.3	138.00
MOD III DRIVE KIT	615.00

MORROW DESIGNS

FLOPPY DISK SYSTEMS

Controller, P.S., Microsoft Basic, CP/M® A & T.

DISCUS 2D (Single Drive — 500K)	1075.00
DISCUS 2D (Dual Drive — 1 MEG)	1695.00
DISCUS 2 + 2 (Single Drive — 1 MEG)	1777.00
DISCUS 2 + 2 (Dual Drive — 2 MEG)	2317.00

HARD DISK SYSTEMS

Controller, P.S., Microsoft Basic, CP/M® A & T.

DISCUS M10 (10 Megabytes)	3345.00
DISCUS M26 (26 Megabytes)	4045.00

ISOLATORS

ISO-1 3-SOCKET	53.95
ISO-2 6-SOCKET	53.95

BARE DRIVES

TANDON 5¼ INCH

100-1 SINGLE HEAD 40 TRK	209.00
100-2 DUAL HEAD 40 TRK	275.00
100-3 SINGLE HEAD 80 TRK	275.00
100-4 DUAL HEAD 80 TRK	399.00

TANDON THINLINE 8 INCH

848-1 SINGLE SIDE	420.00
848-2 DUAL SIDE	515.00

MICRO PRO

APPLE CP/M®

WORDSTAR*†	222.00
SUPERSORT*†	145.00
MAILMERGE*†	79.00
DATASTAR*†	179.00
SPELLSTAR*†	119.00
CALCSTAR*†	149.00

CP/M®

WORDSTAR	285.00
SUPERSORT	168.00
MAILMERGE	103.00
DATASTAR	235.00
SPELLSTAR	155.00
CALCSTAR	199.00

MICROSOFT

APPLE

FORTRAN*	150.00
BASIC COMPILER*	315.00
COBOL*	550.00
Z-80 SOFTCARD	299.00
RAMCARD	149.00
TYPING TUTOR	17.95
OLYMPIC DECATHLON	24.95
TASC APPLESOFT COMPILER	145.00

CP/M®

BASIC 80	299.00
BASIC COMPILER	319.00
FORTRAN 80	345.00
COBOL 80	568.00
MACRO 80	189.00
mu MATH/mu SIMP	215.00
mu LISP/mu STAR	165.00

APPLE SOFTWARE

MAGIC WINDOW	79.00
MAGIC SPELL	59.00
BASIC MAILER	59.00
DB MASTER	169.00
DB MASTER UTILITY PACK	69.00
DATA CAPTURE 4.0/80	59.95
PFS: GRAPH	89.95
PFS: (NEW) PERSONAL FILING SYSTEM	85.00
PFS: REPORT	79.00
Z-TERM*	89.95
Z-TERM PRO*	129.95
ASCII EXPRESS	63.95
EASY WRITER-PRO	199.00
EASY MAILER-PRO	79.00
EXPEDITER II APPLESOFT COMPILER	73.95
A-STAT COMP. STATISTICS PKG.	129.00
SUPER TEXT II	129.00
LISA 2.5	59.95

CONTINENTAL SOFTWARE

G/L	199.00
A/R	199.00
A/P	199.00
PAYROLL	199.00
PROPERTY MGMT	399.00
THE HOME ACCOUNTANT	59.95

VISICORP

DESKTOP PLAN II	189.00
VISIPLOT	158.00
VISITREND/VISIPLOT	229.00
VISIDEX	189.00
VISITERM	79.00
VISICALC	189.00
VISIFILES	189.00

CP/M® SOFTWARE

THE WORD-SPELL CHECK	75.00
d BASE II	599.00
SUPER CALC	209.00
SPELLGUARD	239.00
P & T CP/M® MOD II TRS-80	175.00
COMMX TERMINAL PROG.	82.50
C BASIC 2	115.00
PASCAL Z	349.00
PASCAL MT+	439.00
PASCAL/M	205.00
SYSTEMS PLUS — G/L, A/R, A/P, P/R	1799.00
CONDOR I	579.00
CONDOR II	849.00

DIGITAL RESEARCH

MAC	89.00
SID	69.00
ZSID	97.00
PL/ 1-80	439.00

SUPERSOFT

DIAGNOSTIC I	69.00
DIAGNOSTIC II	89.00
'C' COMPILER	179.00
UTILITIES I	59.00
UTILITIES II	59.00
RATFOR	89.00
FORTRAN	239.00

TRS-80 GAMES

TEMPLE OF APSHAI	34.95
HELLFIRE WARRIOR	34.95
STAR WARRIOR	34 95
RESCUE AT RIGEL	24.95
CRUSH, CRUMBLE AND CHOMP	24.95
INVADERS FROM SPACE	17.95
PINBALL	17.95
STAR TREK 3.5	17.95
MISSILE ATTACK	18.95
STAR FIGHTER	24.95
SCARFMAN	17.95

TRS-80 SOFTWARE

NEWDOS/80 2.0 MOD I, III	139.00
LAZY WRITER MOD I, III	165.00
PROSOFT NEWSCRIPT MOD I, III	99.00
SPECIAL DELIVERY MOD I, III	119.00
X-TRA SPECIAL DELIVERY MOD I, III	199.00
TRACKCESS MOD I	24.95
OMNITERM SMART TERM. MOD I, III	89.95
MICROSOFT BASIC COMP. FOR MOD I	165.00
LDOS 5.1 MOD I, III	159.00

APPLE GAMES

PERSONAL SOFTWARE

CHECKER KING	21.95
GAMMON GAMBLER	21.95
MONTY PLAYS MONOPOLY	29.95

BRODERBUND

GALAXY WARS	20.95
ALIEN TYPHOON	20.95
APPLE PANIC	24.95
MIDNIGHT MAGIC	29.95
SPACE QUARKS	24.95

AUTOMATED SIMULATIONS

INVASION ORION	20.95
STAR WARRIOR	32.95
TUES. MORNING QUARTERBACK	25.95
CRUSH, CRUMBLE AND CHOMP	24.95
THE DRAGON'S EYE	20.95

MUSE SOFTWARE

ROBOT WARS	32.95
THREE MILE ISLAND	32.95
A.B.M.	20.95
GLOBAL WAR	20.95
CASTLE WOLFENSTEIN	24.95

ON-LINE SYSTEMS

WIZARD AND PRINCES	29.95
MISSILE DEFENSE	25.95
SABOTAGE	20.95
SOFT PORN ADVENTURE	24.95
THRESHOLD	31.95
JAW BREAKER	24.95
CROSSFIRE	24.95
TIME ZONE	69.95
H/R FOOTBALL	32.95
H/R CRIBBAGE	20.95
PEGASUS II	25.95

SIRIUS SOFTWARE

SPACE EGGS	24.95
GORGON	32.95
SNEAKERS	24.95
EPOCK	29.95
BEER RUN	24.95
HADRON	29.95
PULSAR II	24.95
EPOCK	29.95

EDU-WARE

PERCEPTION PKG.	19.95
COMPU-READ	24.95
COMPU-MATH: ARITHMETIC	39.95
COMPU-MATH: FRACTIONS	34.95
COMPU-MATH: DECIMALS	34.95
COMPU-SPELL (REQ. DATA DISK)	24.95
COMPU SPELL DATA DISKS 4-8, ea.	17.95

MORE GREAT APPLE GAMES

COMPUTER QUARTERBACK	32.95
TORPEDO FIRE	49.95
THE SHATTERED ALLIANCE	49.95
POOL 1.5	29.95
ULTIMA	33.95
RASTER BLASTER	24.95
FLIGHT SIMULATOR	27.95
INTERNATIONAL GRAND PRIX	25.95
SARGON II	28.95
SHUFFLE BOARD	29.95
FIREBIRD	24.95
SNACK ATTACK	24.95
THIEF	24.95
ROACH HOTEL	29.95
JABBERTALKY	24.95
THE WARP FACTOR	32.95
COSMO MISSION	24.95
WIZARDRY	37.95
ZORK I	32.95
ZORK II	32.95

SUPPLIES

AVERY TABULABLES

1,000 3½ x 15/16	8.49
3,000 3½ x 15/16	14.95
5,000 3½ x 15/16	19.95

FAN FOLD PAPER

(Prices F.O.B. S.P.)

9½ x 11 18lb WHITE 3,000 ct.	29.00
14 7/8 x 11 18lb WHITE 3,000 ct.	39.00

Alpha Byte
COMPUTER PRODUCTS

To order or for information call
(213) 706-0333
Modem order line: (213) 883-8976

We guarantee everything for 30 days. If anything is wrong, return the item and we'll make it right. And, of course, we'll pay the shipping charges.

We accept Visa and Master Card on all orders; COD up to $300.00.

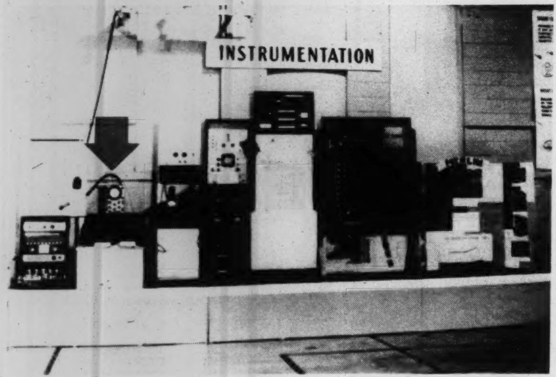
Add $2.00 for standard UPS shipping and handling on orders under 50 lbs, delivered in continental U.S. Call for shipping charges over 50 lbs. Foreign, FPO and APO orders, add 15% for shipping. Californians add 6% sales tax.

Prices quoted are for stock on hand and subject to change without notice.

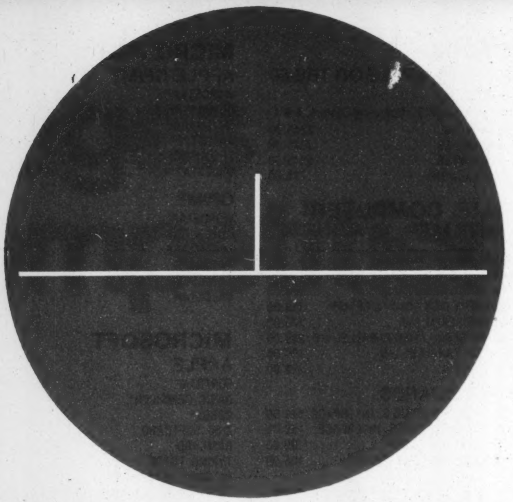
31245 LA BAYA DRIVE, WESTLAKE VILLAGE, CALIFORNIA 91362

CIRCLE 105 ON READER SERVICE CARD

CP/M is a reg. trademark of Digital Research. *Requires Z-80 Softcard. †Reg. trademark of Micro Pro International Corp.



The oscilloscope on which the game appeared.



"We knew it was fun, and saw some potential in it at the time, but it wasn't something the government was interested in. It's a good thing, too. Today all video game designers would have to license their games from the federal government!" The idea somehow pleased Willy, and his laughter signalled it.

To Magnavox, however, the rights to video games are no laughing matter; they could mean millions. The corporation seeks a patent on video games using bouncing balls, and has taken sworn depositions from Higinbotham concerning his own invention. Though Willy stands to make no monetary gain whatsoever, he has a personal stake in the contest.

One must take a broader view of Willy's career to see the tennis game from the perspective that he himself does.

Higinbotham was a graduate student in Physics at Cornell University at the outbreak of World War II. He was invited to join research at the MIT Radiation Laboratory, where he worked on an advanced and important technique known as radio detecting and ranging, later shortened to RADAR.

From there he joined the Manhattan District Project, working as a physicist on another exotic and potentially important technology. He became head of the Electronics Division there in 1945. Higinbotham devised the timing circuits that took the first atomic bomb through the last few milliseconds preceding detonation.

> **"We knew it was fun, and saw some potential in it at the time, but it wasn't something the government was interested in."**

He worked with and knew J. Robert Oppenheimer quite well. "He was a charismatic man," says Willy. "People tended either to worship or detest him. I did neither. He was brilliant, though. There's no doubt of that."

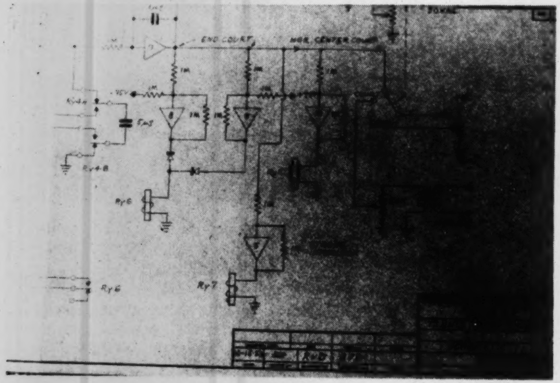
At the time of the blast at Los Alamos, Willy was 24 miles from ground zero, able to watch the entire detonation through welder's glass so thick, he couldn't see an illuminated headlight through it.

I asked him what it had been like. He grew quiet. He said that he and the other observers got into the trucks and made the long trip back to the compound in utter silence. No one had anything to say.

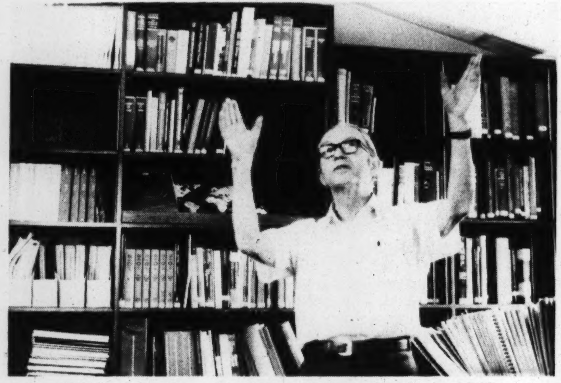
Willy spent the next two years as executive secretary of the Federation of American Scientists, in Washington, D.C. He acted as a liaison between Congress and scientists, lobbying for the nonproliferation of nuclear weapons.

"It's taken over thirty years," Willy observes, "but the message is finally beginning to get through." His face brightens. Today, as a senior scientist at Brookhaven Laboratory, he and his colleagues have amassed the largest and most comprehensive library in the world concerning nuclear safeguards.

I was warming up the car for the long trip home, staring across a field at the building housing the cyclotron. He's not only something, I thought to myself. He's a walking bit of history. He also invented the video game! ☐



Note the date of the blueprint: Oct. 1958. This date has been verified.



Willy describes the sight at Alamogordo in 1945.

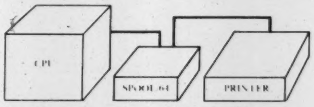
How many times must your computer stop just to talk to your printer?

BASED ON INCREASED PRODUCTION WE HAVE LOWERED THE PRICE 20%. SPOOL/64 NOW $319.

Your computer talks faster than your printer can listen. Expensive time is lost forever. SPOOL/64, a 64k byte hardware print spooler, keeps your computer processing while your printer is printing. No more waiting. No more wasting.

SPOOL/64 buffers your print output and transmits the information to your printer at the printer's specific print rate. It buffers up to 13 minutes of print output (at 80 characters per second).

SPOOL/64 plugs directly into both your printer and computer, accepts input from parallel centronics cables (serial RS-232 available soon), and its user programming feature allows you to download your own programs so SPOOL/64 can handle sophisticated print routines. And SPOOL/64, used with your software spooler, can give you the highest performance spooling available.



SPOOL/64
RESET
Apparat Inc

SPOOL/64 utilizes 64k of dynamic RAM, a Z-80 CPU, a 2716 ROM and a copy of the source program for the object code in the ROM is included.

SPOOL/64, priced at just ~~$399~~ $319, is the most cost/effective print spooler on the market. Evaluate performance. Evaluate price. Then let SPOOL/64 get your computer back talking to you. Call or write Apparat today for a free brochure. Dealer inquiries invited.

VISA MasterCard

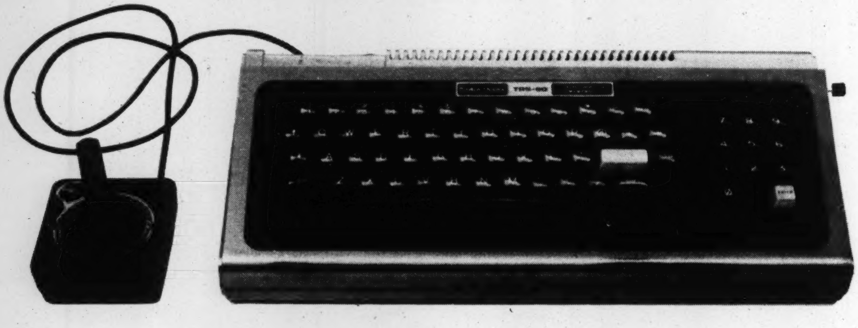
Apparat, Inc.

4401 So. Tamarac Parkway, Denver, CO 80237 (303) 741-1778

"ON GOING SUPPORT FOR MICROCOMPUTERS"

CIRCLE 109 ON READER SERVICE CARD

Add a Joystick to Your TRS-80!



Marc B. Stanis
and
David H. Ahl

Are your fingers as uncoordinated as mine when you try to play *Scarfman* or *Robot Attack*? Somehow, I just don't seem to be able to remember which fingers are controlling up and down movement and which are controlling right and left. And then remembering to fire with my thumb; by this time I'm all thumbs.

This article describes how to add a joystick to a TRS-80 Model I or III in an hour or so for the bargain price of around $15. The joystick is completely compatible with all software (Basic and machine language) that uses the four arrow keys to move and the space bar to shoot.

Since the joystick parallels the keyboard, it doesn't require a power supply. It need not be disconnected after use, nor does it contain any electronic parts. If, for some reason the joystick malfunctions, your computer isn't in danger. At worst, you might have to replace the joystick.

Before you begin construction, read through this entire procedure and be sure you understand it. You will need the parts listed in the table. You should also be aware that this installation will void the warranty on your computer and that it will have to be removed if the computer ever needs servicing by Radio Shack. Even if the modification has been removed the warranty is still void.

Atari joysticks which connect to the ribbon PC connector at the back of the TRS-80 are available from Big Five and Alpha. These do not void the warranty and work with many, but not all games. If you are leery about voiding your warranty we strongly recommend one of these products even though they are slightly less versatile than the one described in this article.

Examine the Joystick

The first step is to remove the four Phillips head screws from the bottom of the Atari joystick case. Remove the stick mechanism. Be careful not to lose the small spring on the firing button. Examine the printed circuit board. The six connectors on the right side should have wires of the following colors connected to them:

Joystick Position	*Wire Location*	*Color*
Right	Top	Brown
Up	2	White
Common	3	Black
Down	4	Blue
Left	5	Green
Button	Bottom	Orange

If the wire colors do not correspond to this list, change the connectors so they do. Reassemble the joystick taking care that the firing button spring is back in place and that no wires are pinched—either between the edges of the case or between the edge of the case and the PC board.

Cut the DE-9 connector off the end of the Atari joystick cable. Starting from that end of the cable, *carefully* remove 10 to 12 inches of the outer plastic cable sheath with a sharp knife or electrical scissors. Take it slowly and be careful not to damage the six fine wires.

After removing the cable sheath, examine each of the six wires over its entire length to make sure it has not been damaged. If one or more have been damaged, you will have to replace them with fine (24 gauge) flexible wire or remove more of the cable sheath to get 10 to 12 inches of intact wire.

Next, strip off the insulation from the end 1/8" of each wire. Tin the ends of each wire, i.e., with a hot pencil soldering iron, apply a small amount of solder to the tip of each wire. This will make them easier to solder to the PC board in the next step. Apply heat and solder quickly so you do not melt any of the insulation. Inspect your work and set the joystick aside.

Into the Computer

Next you are going to open the computer. Be sure you are working in a static-free location, no rugs, cats, etc. Ground yourself out before starting work by grabbing a water pipe, grounded case of a three-wire power tool, etc.

Remove the screws from the bottom of your computer and remember which screw came from which hole. Label them if necessary. (**Note: Opening your computer voids the warranty.**) If you have a Model I, lift off the bottom of the case and set it aside. *Carefully* flop the PC board in the direction of the wire connector. This exposes the bottom of the printed circuit board of the keyboard.

If you have a Model III, after removing all the screws, turn the computer right side up. Lift the top off and tip it onto the left side leaving all the wires connected. Remove the six screws holding the keyboard cover and set the cover aside. Tip the keyboard forward.

Look at the etching on this PC board. Near each pair of connections (representing each key) is a small silver etching of the name of the key (Model I) or a number (Model III). On the Model I, the second row down on the left, you should find the right and left arrow keys while the rightmost keys in the second and third rows are the up and down arrow keys. Of course, the spacebar is at the bottom. On the Model III everything will be reversed since the keyboard is effectively upside down.

Figures 1 and 2 show the three portions of the etchings on the PC board around the keys of interest. Match this with your keyboard. Solder the colored wires to the connections indicated on Figures 1 or 2.

Marc B. Stanis, 14930 S. Springfield Ave., Midlothian, IL 60445.

Get Omni quality for as little as $1.99. . .

even if all you want is a 10 pack.

Call toll-free for great savings on Omni's complete line of 5¼″ premium disks. Each is certified error-free at a minimum of twice the error threshold of your system. Each is rated for more than 12 million passes without disk-related errors or significant wear. And each is precision fabricated to exceed all ANSI specifications with such standard features as reinforced hub rings and Tyvec sleeves. Get same day shipment and an unconditional, no hassle money-back guarantee.

ARCHIVE

152 Boston Turnpike
Shrewsbury, MA 01545
(800) 343-0314; In Mass:
(617) 756-2960

Disk No.
OMNI
Copyright © 1981 by OMNI Resources

Call for 8″ disk prices.

Call toll free (800) 343-0314 In Mass: (617) 756-2960

Call if you're not sure which disk is compatible with your system. Call for prices on 96 tpi and special formats. We offer an unconditional money-back warranty. We're here to help.

Be sure to indicate system name and model # at right.

# of 10 Packs	5¼″ Disks	Price Per 10 Pack	Total Price
_______	Single side/single density	$19.90	$_______
_______	Single side/double density	$23.90	$_______
_______	Double side/double density	$39.90	$_______
_______	Flip/Floppy reversible Double side/double density	$39.90	$_______
_______	Protective plastic library case (in lieu of soft storage box)	$ 2.99	$_______
	Shipping and handling		$ 2.00
	5% sales tax (Mass. only) Add 40¢ per 10 pack		$_______
		Total	$_______

☐ Check
☐ COD
☐ Master Card
☐ VISA

Card # ______________________ Exp. ______________________

System and model # ______________________

Name ______________________

Address ______________________

____

Tel. ______________________

CIRCLE 112 ON READER SERVICE CARD

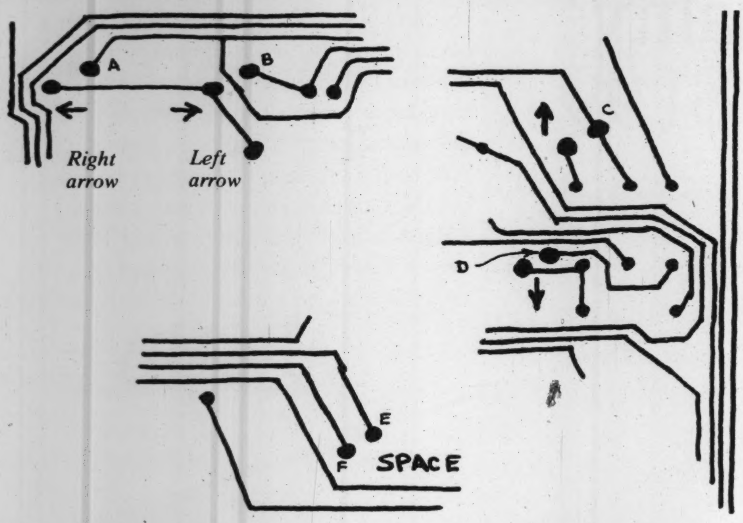


Figure 1. Portions of the TRS-80 Model I keyboard by the arrow keys and spacebar.

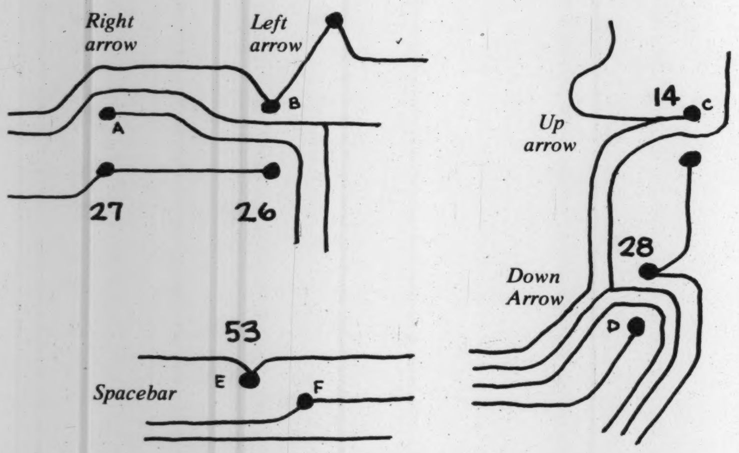


Figure 2. Portions of the TRS-80 Model III keyboard by the arrow keys and spacebar.

Make connections as indicated:

A	*Brown*	*D*	*Blue*
B	*Green*	*E*	*Orange*
C	*White*	*F*	*Black*

Solder these connections by touching the tip of the soldering pencil to the solder blob until it starts to melt (two seconds or so), inserting the tinned end of the wire and quickly removing the soldering pencil. Blow on the connection immediately. Following this procedure should insure that none of the wire insulation melts. If some insulation melts and the exposed wire could possibly touch another connection, unsolder it, cut off the end, tin it, and try again.

Decide where you want the joystick cable to come out of your computer. Model I owners can snake it out through the rectangular ribbon connector hole on the back left of the case although it is difficult to put a strain relief on the cable at this point. A better choice might be the front or either side of the case which choices are also open to Model III owners. With a sharp knife or rat-tail file, cut a small 1/8" notch in the case of the computer.

Back Together Again

Tie a knot in the cable close to the end of the remaining sheathing. Alternatively, you may put a small cable clamp on at this point. Snake the wire to the notch and, with the knot or cable clamp on the inside, reassemble the computer case. When doing this, be sure all the spacers between the PC boards are where they belong, check that nothing is pinched and use the correct screws.

Now comes the moment of truth. Turn on the computer (video display first, if a Model I). If you don't see the normal startup message, immediately turn off the computer; something is wrong. The problem is probably that something is pinched since even gross mistakes in soldering or a shorted connection on the keyboard will not cause a non-startup condition. Re-check everything (keyboard connections, damaged insulation, stray solder blobs, pinched wires, etc.) and reassemble.

After a proper start, try the joystick. Pressing the fire button should print spaces. The up position should print up arrows (Model I) or left brackets (Model III). The left position should print backspaces. The right position should print tabs while the down position should produce a carriage return/line feed. If you get any but these results, open the case and check the connection(s) to the keys which are not responding correctly. Reassemble and try again.

The cable on the Atari joystick is about 40" long; we have used about 12" of it inside the computer which leaves a 28-inch cable. If you feel that this is long enough (it should be for most purposes) and you don't mind having the joystick permanently connected to the computer, then just stop here. You are finished.

On the other hand, if you want a removable joystick or a longer cable, you will have to cut the cable and install male and female connectors and, if you wish, a longer cable. You can choose any one of many in-line connector sets (Cinch-Jones, D.I.N., etc.). Flexible six-conductor cable isn't so readily available and you might have to settle for ribbon cable. Some electronics outlets carry coiled six-conductor microphone cables (for CB and ham replacement use) which is perfect.

Obviously the rule to follow when installing an in-line connector set or longer cable is to maintain the integrity of each wire. When you are done, pushing the joystick left should still act as a left arrow keystroke, the fire button should be a spacebar stroke, and so on.

All done? Load in *Scarfman* or *Robot Attack* or your favorite shoot-'em-up game and you will be amazed. Never thought you could score that high, eh? ☐

YOUR MARKETPLACE FOR:

Royal Software

*ATARI

WE DEAL EXCLUSIVELY IN PRODUCTS
FOR THE ATARI (THE BEST) COMPUTER

HARDWARE

800 Computer 16K	$648
800 Computer 48K	$757
400 Computer 16K	$288
810 Disk Drive	$448
850 Interface	$178
410 Recorder	$ 78
MX80FT+ Printer	$588
16K Ram module	$ 69
32K Ram module	$109
Graphics Tablet	$269
10 Blank Disks	$ 28
Track Ball Controller	$ 63
Percom Disk Drive	$648

SOFTWARE

PAC MAN (cart.)	$39.50
Centipede (cart.)	$39.50
Microsoft Basic (D) 32K	$79.10
Ghost Hunter (T) 16K	$25.50
Ali Baba (D) 32K	$28.90
Rear Guard (T) 16K	$17.90
Track Attack (D) 48K	$26.90
Threshold (D) 40K	$33.90
GORF (D) 16K	$35.10
Crypts of Terror (D,T) 16K	$26.30
Choplifter (D)	$31.40
APX-Text Editor (D) 32K	$39.95
Cactus League Baseball (D)40K	$17.90
De Re Atari Book	$17.90
Atari Games Book	$13.90
Megalegs (D, T) 16K	$31.40
Book Keeping Package (D) 40K	$67.50
Eastern Front (T,D)	$25.40
Bug Attack (T,D) 32K	$26.90
Pacific Coast Hwy (T,D) 16K	$26.90
Alien Swarm (T) 16K	$26.90
Midnight Magic (D) 48K	$31.45
Intruder (T) 16K	$26.90
Nautilus (T,D)	$20.20

CLOWNS AND BALLOONS

CLOWNS AND BALLOONS . . . an action-packed arcade game that'll make you want to join the circus.

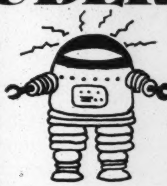
16K DISK or TAPE $26.90

Descend through mazes into the Dungeons with your squadron of warriors to battle with visible and invisible monsters.

Wizard of Wor

16K DISK ONLY $35.10

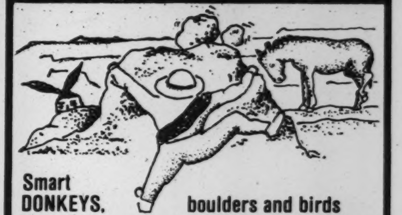
INTRUDER



A secret research installation is protected by two robo-units whose one purpose in life is to destroy all intruders. A major earthquake has struck this region. The "hot room" is a shambles! A meltdown at the installation is imminent! Your job is to guide a repair robot into this area and avoid being caught by the mad robo-units.

16K
$26.90 TAPE
$31.40 DISK

Canyon Climber



Smart DONKEYS, boulders and birds dropping rocks try to stop you from reaching the top. A real challenge. Arcade quality.

16K
DISK $26.90 TAPE $22.40

CROSSFIRE

The aliens have landed and it's your job to save the city.

(If you can!) TOP RATE GAME, ARCADE QUALITY, HI-RES Graphics & Sound.

16K TAPE
32K DISK
$26.90

FROGGER

This is the genuine FROGGER game that you see in the arcades. Made by the same people that made Jawbreaker (One of the top ten sellers.)

16K DISK OR TAPE
$31.40

Call or Write for

FREE

ATARI PRODUCTS CATALOG
with hundreds of items

VISA master charge

TO ORDER CALL TOLL FREE 800-452-8013

FOR INFORMATION
CALL 503-683-5361

HOW TO ORDER: Send check or money order or call our toll free number and use your Visa Card. Shipping on software is $2.00 per order anywhere in USA. Hardware shipping call for cost. Add 3% for VISA or MC. Equipment subject to price change and availability without notice.

Store Hours
8 am — 6 pm
Mon. — Sat.

Royal Software

2160 W. 11th Ave.
Eugene, Oregon 97402

* Atari is Trademark of Atari Inc.

CIRCLE 259 ON READER SERVICE CARD

Joytricks

John Anderson

Ever stare at the controller jacks in the front of your Atari computer and imagine all sorts of exotic hardware to connect up to it? I have, and while my work on a fully articulated robot arm is progressing quite slowly, there are a few modification projects I've undertaken that require little time, cost very few dollars, and provide nice results.

End Discrimination Against Lefties

As a left-handed gamesman, I've long suspected that my scores have been held down by the fact that joysticks are designed for righties. It's a very simple matter to turn a standard issue Atari joystick (fire button top left) into a lefty stick (fire button top right).

When you disassemble the joystick, be careful not to lose any of the screws or the little spring that sits in the trigger button. Hold the circuit board so it resembles the configuration in Figure 1. Note: newer Atari joysticks have all the connectors on one side of the PC board while older ones have three connectors on each side.

The leads must be removed from the board (grasp the collars; do not pull on the wires themselves) and reattached as shown. That's all there is to it—except to prominently label your new lefty joystick so that it does not drive some poor righty mad. The stick is now "referenced" with the trigger to the upper right.

A Pushbutton Peripheral For Under $8

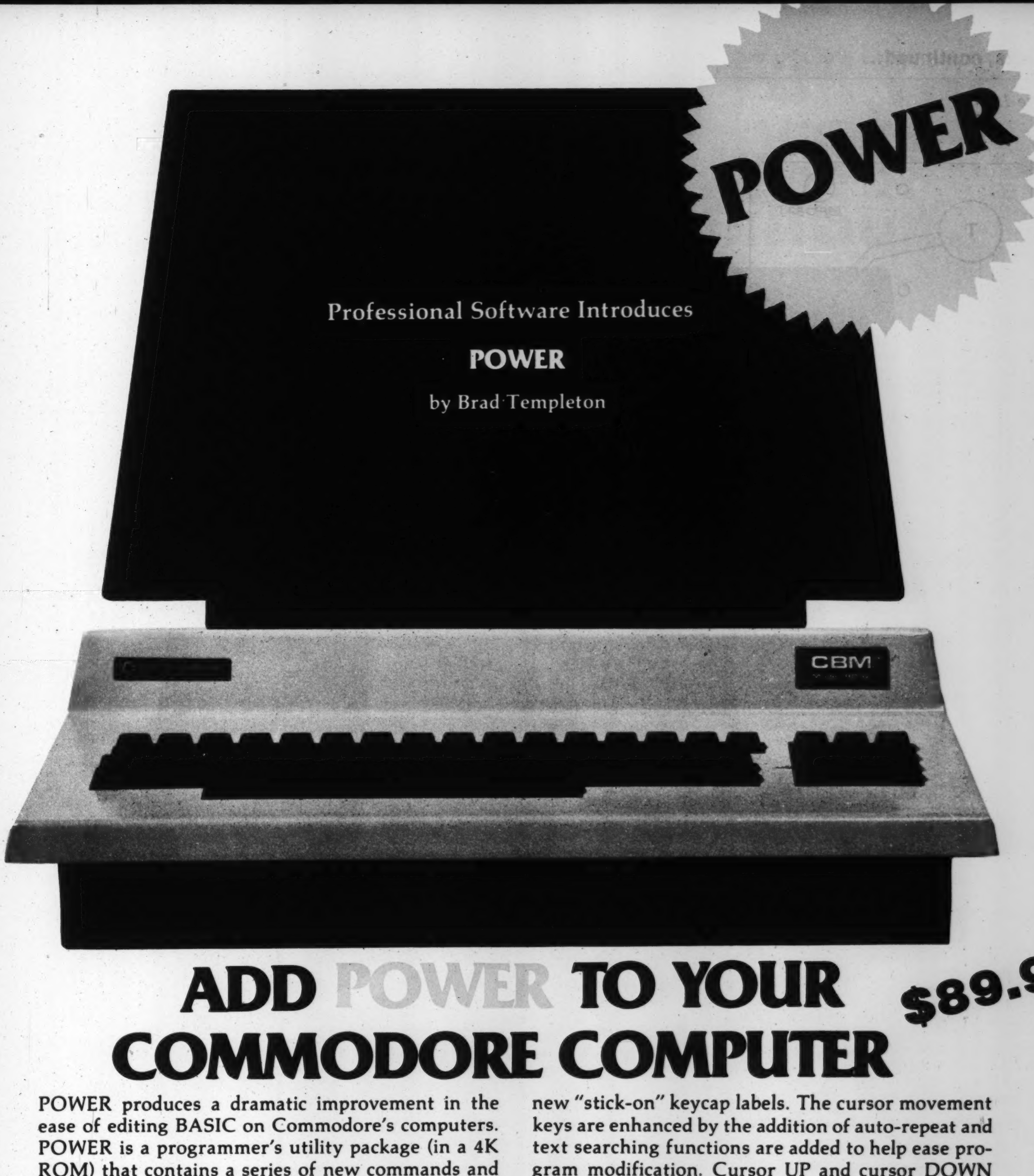
I've been thinking about a homebrew controller jack peripheral for quite some time now, but the genesis of this idea really belongs to Rick Rowland. Though the controller is at its best when playing a limited number of games, you can do quite a bit with it. If you have a joystick that has seen better days and is ready for retirement, you can reincarnate it as a pushbutton peripheral.

The idea is simple: create a panel of pushbuttons to control all joystick functions.

The idea is simple: create a panel of pushbuttons to control all joystick functions. The Asteroids you'll find in arcades, as well as Space Invaders, Galaxian, and other games, use button rather than joystick input. You can open up this realm at home with a few parts readily available at Radio Shack, and the cord from an old stick (you may try finding a DE-9 plug at an electronics store, and making a cord yourself).

You need only a few short snips of wire, some switches, and a box to mount it all in. I used three packages of push button switches (Radio Shack catalog #275-609). These are momentary contact switches, packed two to a package. I mounted five of them in a deluxe project case (Radio Shack #270-222). The total cost of these items was under $8.00, and created a new and enjoyable input device.

Probably the toughest thing about the whole project is putting the mounting holes into the project case. If you don't have access to a drill with a suitably sized bit or hole cutter, you can do what I did: use your soldering iron to start the hole, and then ream it to size using the blade of a scissors. The two tricks to this technique are to work slowly, constantly checking the diameter of the hole against the switch collar, and not burning and/or cutting yourself. It can be done, and that's an advantage of a plastic project case



Professional Software Introduces

POWER

by Brad Templeton

ADD POWER TO YOUR COMMODORE COMPUTER

$89.95

POWER produces a dramatic improvement in the ease of editing BASIC on Commodore's computers. POWER is a programmer's utility package (in a 4K ROM) that contains a series of new commands and utilities which are added to the Screen Editor and the BASIC Interpreter. Designed for the CBM BASIC user, POWER contains special editing, programming, and software debugging tools not found in any other microcomputer BASIC. POWER is easy to use and is sold complete with a full operator's manual written by Jim Butterfield.

POWER's special keyboard 'instant action' features and additional commands make up for, and go beyond the limitations of CBM BASIC. The added features include auto line numbering, tracing, single stepping through programs, line renumbering, and definition of keys as BASIC keywords. POWER even includes new "stick-on" keycap labels. The cursor movement keys are enhanced by the addition of auto-repeat and text searching functions are added to help ease program modification. Cursor UP and cursor DOWN produce **previous** and next lines of source code. COMPLETE BASIC program listings in memory can be displayed on the screen and scrolled in either direction. POWER is a must for every serious CBM user.

Call us today, for the name of the Professional Software dealer nearest you.

Professional Software Inc.
166 Crescent Road
Needham, MA 02194
Tel: (617) 444-5224 Telex #951579

CIRCLE 243 ON READER SERVICE CARD

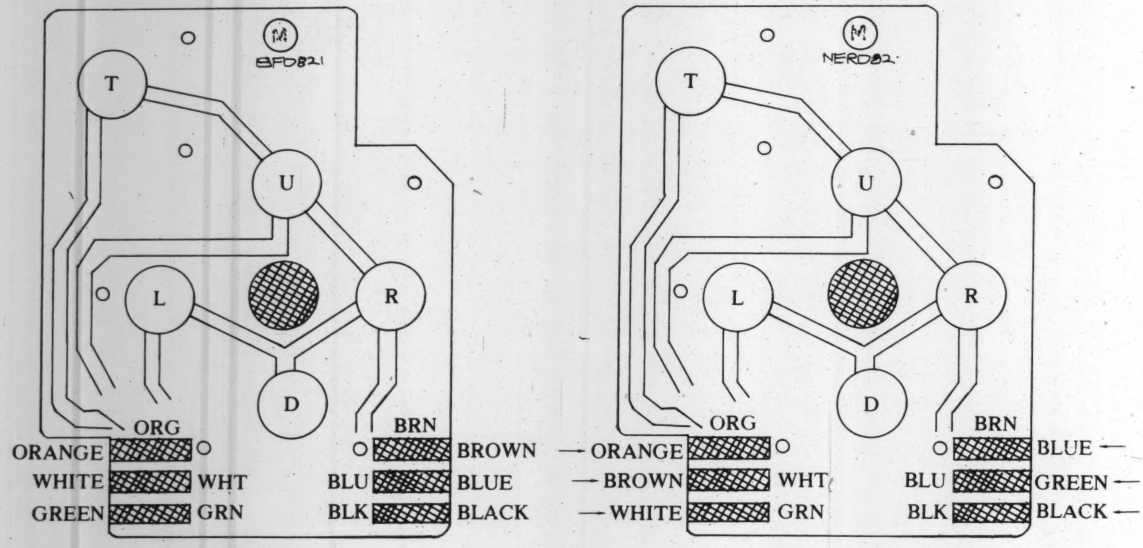


Figure 1.

M
BFD821
T
U
L
R
D
ORG
BRN
ORANGE
WHITE
GREEN
WHT
GRN
BROWN
BLU
BLUE
BLK
BLACK
M
NERD82
T
U
L
R
D
ORG
BRN
→ ORANGE
→ BROWN
→ WHITE
WHT
GRN
BLU
BLK
BLUE ←
GREEN ←
BLACK ←

ORIGINAL WIRING

"LEFTY" MODIFICATION

T = Trigger
L = Left
R = Right
D = Down
U = Up

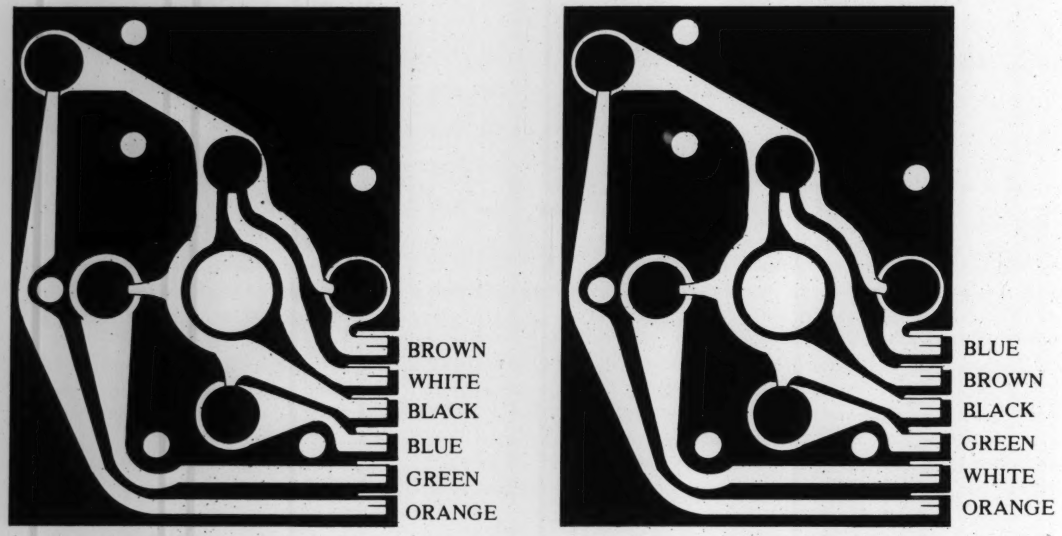


Figure 1A. New Style Joystick.

BROWN
WHITE
BLACK
BLUE
GREEN
ORANGE
BLUE
BROWN
BLACK
GREEN
WHITE
ORANGE

ORIGINAL WIRING

"LEFTY" MODIFICATION

IF YOU'RE WAITING FOR THE PRICE OF WORD PROCESSORS TO FALL WITHIN REASON,

IT JUST DID.

commodore
CBM
WordPro PLUS
OFFICIALLY APPROVED COMMODORE DEALER

Everyone expected it would happen sooner or later...with WordPro PLUS™ it already has! Now all the marvelous benefits of expensive and advanced word processing systems are available on Commodore computers, America's largest selling computer line. WordPro PLUS, when combined with the new 80 column CBM 8032, creates a word processing system comparable to virtually any other top quality word processor available—but at savings of thousands of dollars!

New, low cost computer technology is now available at a fraction of what you would expect to pay. This technology allowed Commodore to introduce the new and revolutionary CBM 8032 Computer.

WordPro PLUS turns this new CBM 8032 Computer into a sophisticated, time saving word processing tool. With WordPro PLUS, documents are displayed on the computer's screen. Editing and last minute revisions are simple and easy. No more lengthy re-typing sessions. Letters and documents are easily re-called from memory storage for editing or printing with final drafts printed perfectly at over five hundred words per minute!

Our nationwide team of professional dealers will show you how your office will benefit by using WordPro PLUS. At a price far less than you realize.

Invest in your office's future...
Invest in WordPro PLUS...
Call us today for the name of the WordPro PLUS dealer nearest you.

Professional Software Inc.
166 Crescent Road
Needham, MA 02194
(617) 444-5224
TELEX: 95 1579

CIRCLE 244 ON READER SERVICE CARD

Kelly's Computing

ATARI SPECIALS

☐ PAC MAN (CART)	44.95	*Now*	**38.50**
☐ CENTIPEDE (DUE AUG. OR SEPT.)(CART)	44.95	*Now*	**38.50**
☐ CAVERNS OF MARS (DISK)	39.95	*Now*	**33.50**
☐ SPACE INVADERS (CART)	44.95	*NOW*	**$27^{\underline{50}}$**
☐ STAR RAIDERS (CART)	49.95		
☐ ASTEROIDS (CART)	44.95		
☐ MISSILE COMMAND (CART)	44.95		
☐ JOYSTICKS (PAIR) (ACCS)	21.95	*Now*	**19.50**
☐ PADDLES (PAIR) (ACCS)	21.95	*Now*	**19.50**
☐ GOLD EDITION 1-12 (DISK & CASS) (WHILE THEY LAST)	100.00	*Now*	**87.50**
☐ ADVENTURES 1-12 (CASS) ea.	19.95	*Now*	**16.50**
☐ LUNAR LANDER (CASS)	14.95	*Now*	**12.50**
☐ STAR TREK 3.5 (DISK)	19.95	*Now*	**16.50**
☐ REAR GUARD (DISK)	19.95	*Now*	**16.50**
☐ GALACTIC EMPIRE (CASS)	19.95	*Now*	**16.50**
☐ GALACTIC TRADER (CASS)	19.95	*Now*	**16.50**
☐ TREASURE QUEST (CASS)	19.95	*Now*	**16.50**
☐ PREPPIE (AVAILABLE MAY)(DISK)	24.95	*Now*	**19.50**
☐ GHOST HUNTER (DISK)	34.95	*Now*	**29.50**
☐ GHOST HUNTER (CASS)	29.95	*Now*	**25.50**
☐ ARCADE PRO FOOTBALL (DISK)	34.95	*Now*	**29.50**
☐ ARCADE PRO FOOTBALL (CASS)	29.95	*Now*	**25.50**
☐ PREPPIE (DISK)	29.95	*Now*	**25.50**
☐ PREPPIE (CASS)	24.95	*Now*	**19.50**
☐ TEMPLE OF APSHAI (DISK & CASS)	39.95	*Now*	**33.50**
☐ STAR WARRIOR (DISK & CASS)	39.95	*Now*	**33.50**
☐ RESCUE AT RIGEL (DISK & CASS)	29.95	*Now*	**25.50**
☐ DATESTONES OF RYN (DISK & CASS)	19.95	*Now*	**16.50**
☐ CRUSH, CRUMBLE & CHOMP (DISK & CASS)	29.95	*Now*	**25.50**
☐ INVASION ORION (DISK & CASS)	24.95	*Now*	**19.50**
☐ RICOCHET (DISK & CASS)	19.95	*Now*	**16.50**
☐ UPPER REACHES OF APSHAI	19.95	*Now*	**16.50**
☐ CURSE OF RA	19.95	*Now*	**16.50**
☐ CRYPTS OF TERROR (DISK)	34.95	*Now*	**29.50**
☐ CRYPTS OF TERROR (CASS)	29.95	*Now*	**25.50**
☐ EMPIRE OF THE OVERMIND (DISK)	35.00	*Now*	**29.50**
☐ TANKTICS (DISK)	29.00	*Now*	**25.50**
☐ TANKTICS (CASS)	24.00	*Now*	**19.50**
☐ CONTROLLER (DISK)	30.00	*Now*	**25.50**
☐ CRYPTS OF TERROR (CASS)	29.95	*Now*	**25.50**
☐ EMPIRE OF THE OVERMIND (DISK)	35.00	*Now*	**29.50**
☐ EMPIRE OF THE OVERMIND (CASS)	29.50	*Now*	**25.50**
☐ TANKTICS (DISK)	29.00	*Now*	**25.50**
☐ TANKTICS (CASS)	24.00	*Now*	**19.50**
☐ GALAXY (DISK)	25.00	*Now*	**19.50**
☐ B-1 NUCLEAR BOMBER (CASS)	16.00	*Now*	**12.50**
☐ MIDWAY CAMPAIGN (CASS)	16.00	*Now*	**12.50**
☐ NORTH ATLANTIC CONVOY RAIDER (CASS)	16.00	*Now*	**12.50**
☐ NUKEWAR (CASS)	16.00	*Now*	**12.50**
☐ CONFLICT 2500 (CASS)	16.00	*Now*	**12.50**
☐ PLANET MINERS (CASS)	16.00	*Now*	**12.50**
☐ LORDS OF KARMA (CASS)	20.00	*Now*	**16.50**
☐ APPLE PANIC (DISK)	29.95	*Now*	**25.50**
☐ RASTER BLASTER (DISK)	29.95	*Now*	**25.50**
☐ BUG ATTACK (AVAIL. SPRING) (DISK & CASS)	29.95	*Now*	**25.50**
☐ TUMBLE BUGS (DUNG BEETLES) (DISK)	29.95	*Now*	**25.50**
☐ CANYON CLIMBER (DISK & CASS)	29.95	*Now*	**25.50**
☐ LE STICK (ACCS)	39.95	*Now*	**33.50**
☐ PACIFIC COAST HIGHWAY (DISK & CASS)	29.95	*Now*	**25.50**
☐ INTRUDER (DISK)	34.95	*Now*	**29.50**
☐ INTRUDER (CASS)	29.95	*Now*	**25.50**
☐ SHOOTING ARCADE (DISK & CASS)	29.95	*Now*	**25.50**
☐ TRACK ATTACK (DISK)	29.95	*Now*	**25.50**
☐ CLOWNS & BALLOONS (DISK & CASS)	29.95	*Now*	**25.50**
☐ MEGALEGS (DISK & CASS)	34.95	*Now*	**29.50**
☐ COMPU-READ (DISK)	29.95	*Now*	**25.50**
☐ COMPU-MATH/FRACTIONS (DISK)	39.95	*Now*	**33.50**
☐ COMPU-MATH/DECIMALS (DISK)	39.95	*Now*	**33.50**
☐ COMPU-READ (CASS)	19.95	*Now*	**16.50**

☐ COMPU-MATH/FRACTIONS (CASS)	29.95	*Now*	**25.50**
☐ COMPU-MATH/DECIMALS (CASS)	29.95	*Now*	**25.50**
☐ MATCH RACERS (DISK)	29.95	*Now*	**25.50**
☐ PATHFINDER (AVAIL. FALL)(DISK)	34.95	*Now*	**29.50**
☐ DEADLINE (DISK)	49.95	*Now*	**42.50**
☐ ZORK I (DISK)	39.95	*Now*	**33.50**
☐ ZORK II (DISK)	39.95	*Now*	**33.50**
☐ POOL 400 (CART)	39.95	*Now*	**33.50**
☐ ACTION QUEST (DISK & CASS)	29.95	*Now*	**25.50**
☐ K-RAZY SHOOTOUT (CART)	49.95	*Now*	**42.50**
☐ SPEED READ PLUS (DISK)	59.95	*Now*	**50.50**
☐ HI-RES ADV. #0- MISSION: ASTEROID (DISK)	24.95	*Now*	**19.50**
☐ HI-RES ADV. #2- WIZ & PRINCESS (Disk)	32.95	*Now*	**29.50**
☐ CROSSFIRE (DISK)	29.95	*Now*	**25.50**
☐ MOUSEKATTACK (DISK)	34.95	*Now*	**29.50**
☐ JAWBREAKER (DISK & CASS)	29.95	*Now*	**25.50**
☐ THRESHOLD (DISK)	39.95	*Now*	**33.50**
☐ SOFTPORN ADVENTURE (DISK)	29.95	*Now*	**25.50**
☐ THE NEXT STEP (DISK)	39.95	*Now*	**33.50**
☐ FROGGER (AVAIL. FALL)(DISK & CASS)	34.95	*Now*	**29.50**
☐ ALI BABA AND THE FORTY THIEVES (DISK)	32.95	*Now*	**29.50**
☐ DELUXE INVADERS (DISK)	34.95	*Now*	**29.50**
☐ GORF (DISK)	39.95	*Now*	**33.50**
☐ WIZARD OF WOR (DISK)	39.95	*Now*	**33.50**
☐ GALACTIC CHASE (DISK)	29.95	*Now*	**25.50**
☐ GALACTIC CHASE (CASS)	24.95	*Now*	**19.50**
☐ THE SHATTERED ALLIANCE (DISK)	39.95	*Now*	**33.50**
☐ ADVENTURE ON A BOAT (AT-FA1) (DISK)	24.95	*Now*	**19.50**
☐ GHOSTLY MANOR (AT-FA2) (DISK)	24.95	*Now*	**19.50**
☐ BLACK FOREST (AT-FA3) (DISK)	24.95	*Now*	**19.50**
☐ PROTECTOR (DISK & CASS)	29.95	*Now*	**25.50**
☐ CHICKEN (DISK & CASS)	29.95	*Now*	**25.50**
☐ DODGE RACER (DISK & CASS)	24.95	*Now*	**19.50**
☐ WARLOCK'S REVENGE (DISK)	35.00	*Now*	**29.50**
☐ VISICALC (DISK)	250.00	*Now*	**219.50**
☐ CANYON CLIMBER (DISK & CASS)	29.95	*Now*	**25.50**
☐ POOL 400 (CART)	39.95	*Now*	**33.50**
☐ WORDRACE (DISK)	24.95	*Now*	**19.50**
☐ SLIME (AVAIL. SEPT.)(DISK & CASS)	29.95	*Now*	**25.50**
☐ PROTECTOR (DISK & CASS)	29.95	*Now*	**25.50**
☐ CHICKEN (DISK & CASS)	29.95	*Now*	**25.50**
☐ ALIEN SWARM (DISK)	34.95	*Now*	**29.50**
☐ ALIEN SWARM (CASS)	29.95	*Now*	**25.50**
☐ DODGE RACER (DISK & CASS)	29.95	*Now*	**25.50**
☐ SNAKE BYTE (DISK)	29.95	*Now*	**25.50**
☐ CYCLOD (DISK)	29.95	*Now*	**25.50**

RAM FOR ATARI 400 + 800

48K (Reg $299.00) *NOW* **225.00**

32K (Reg. $199.00) *NOW* **125.00**

SEND FOR FREE PRICE LIST

Include $2.00 for Shipping and Handling. California Residents add 6% Sales Tax. All orders shipped from stock within 48 hours. We accept **Mastercard** and **VISA.** C.O.D.'s add $5.00. Prices subject to change without notice. Overseas shipping extra. Credit $1.00 for phone orders.

NAME ____________________

STREET ____________________

CITY __________ STATE _____ ZIP _____

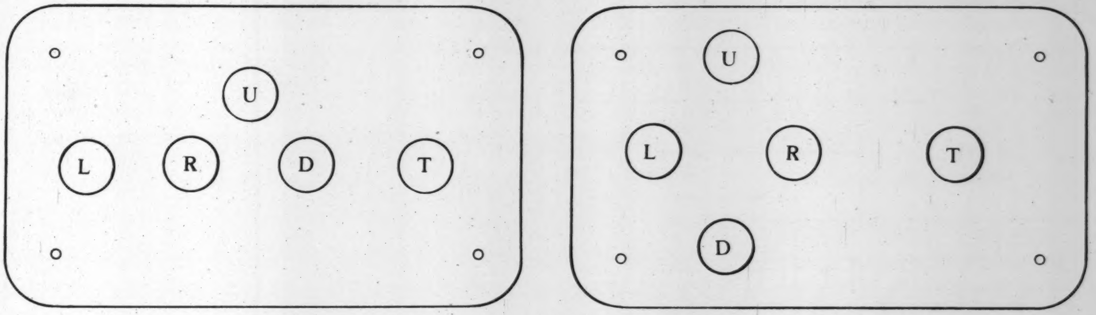
CARD # __________ EXP. DATE ________

SIGNATURE ____________________

3515 Bryce Way, Riverside, CA 92506 • (714) 787-7002

CIRCLE 187 ON READER SERVICE CARD

Figure 2.



"Arcade" Style

"Clock-Directional" Style

T = Trigger
L = Left
R = Right
D = Down (Hyperspace)
U = Up (Thrust)

(another is its low price).

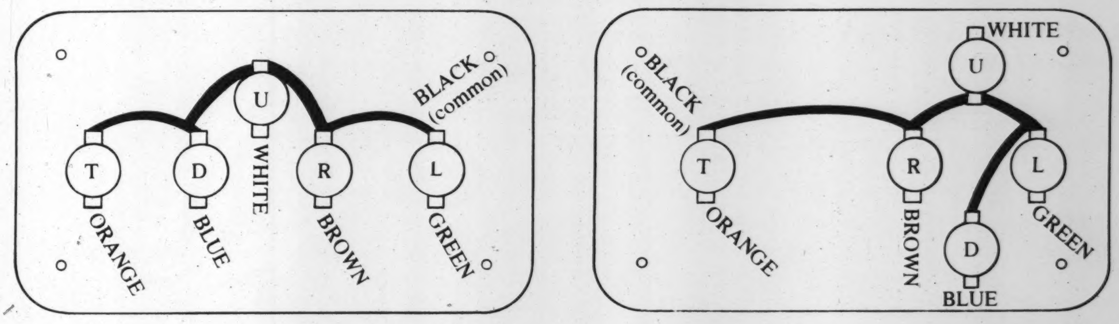
Refer to Figure 2 for possible button configurations. The first is the "classic" Asteroids format. If you're building a peripheral just to play Asteroids, this is the way to go. The second is what we might call a "clock-directional" format, which in the long run proves to be a more versatile set-up. I made up one of each, and prefer the clock-directional arrangement for a variety of games.

You will need a groove in the box portion of the case to allow the cord to pass through. You may again use the soldering iron to do this, making the groove only wide enough to push the retaining collar in. This way it won't be easy to yank the wire out by its roots.

In order to wire up the new peripheral, refer to Figure 3. As far as I know, this color scheme is standard. In order to attach connectors to the pushbuttons, you'll want to press each connector lightly between the jaws of a pliers. If you are careful about this, you will create a good connection without losing the ability to remove the cable later. Those of you who wish to make your own cord will have to find a DE-9 connector, (which may not be easy), and wire it as shown in Figure 4.

Necessarily, diagonal motion is tough with this configuration, as it requires two buttons to be pressed simultaneously. As a result, games in which the player moves in one dimension are especially suited for pushbutton input (Asteroids is a notable exception). If you feel really brave, try it with a maze game, like *Jawbreaker*.

Figure 3. Flip-Side Wiring Diagram.



"Arcade" Style

"Clock-Directional" Style

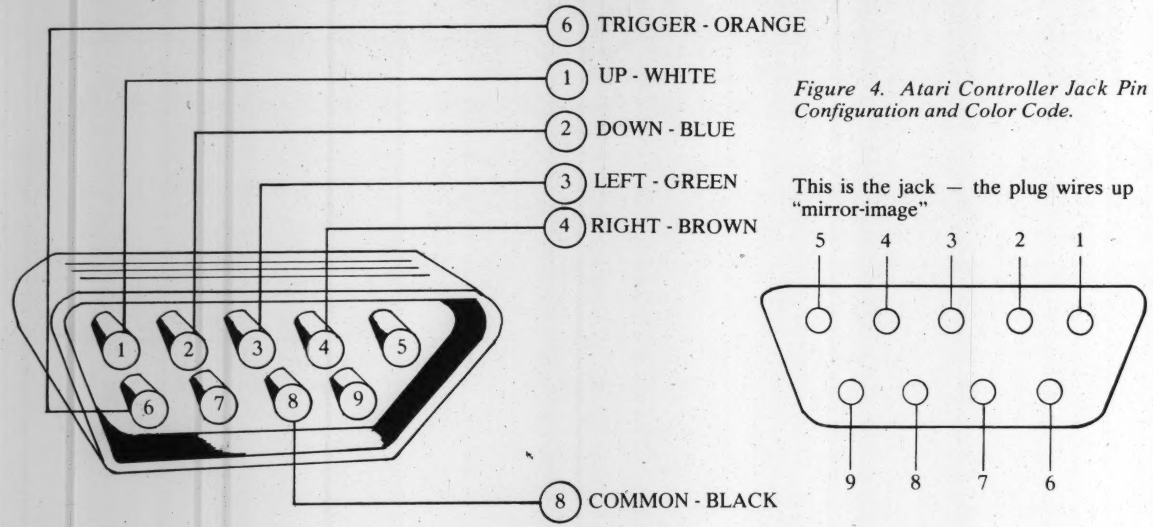


Figure 4. Atari Controller Jack Pin Configuration and Color Code.

This is the jack — the plug wires up "mirror-image"

Double Your Fire Power

If you construct a pushbutton peripheral with the parts I've listed above, you will have an extra button left over. It is a relatively simple matter to attach this button to the handle of an existing joystick, thereby adding a second trigger in a very handy place. It's nice to be able to fire with the same hand that steers, and because the conventional trigger remains enabled, you can easily squeeze off more shots this way.

Use a blade of your trusty (and by this time, quite dull) scissors to press a hole through the top of the stick. Next, disassemble the stick, following the instructions given above for the "lefty" modification. Remove the white plastic stem from inside the handle. Using a saw or serrated kitchen knife, cut off about a half an inch from the top of the stem. This will provide the needed room for the switch.

Unscrew all collars and retainers from the neck of the button. Solder two 12-inch lengths of wire to the switch contacts, braiding these leads together. Pass them through the hole you made on top of the stick, and through the white plastic stem. Then screw the pushbutton directly into the top of the joystick handle. The other ends of the leads attach as shown in Figure 5. Reassemble the stick, remaining mindful of that little spring that sits on the original trigger button. You will effectively have doubled your firing ability. Remember, however, some games do not allow for excessively rapid fire play.

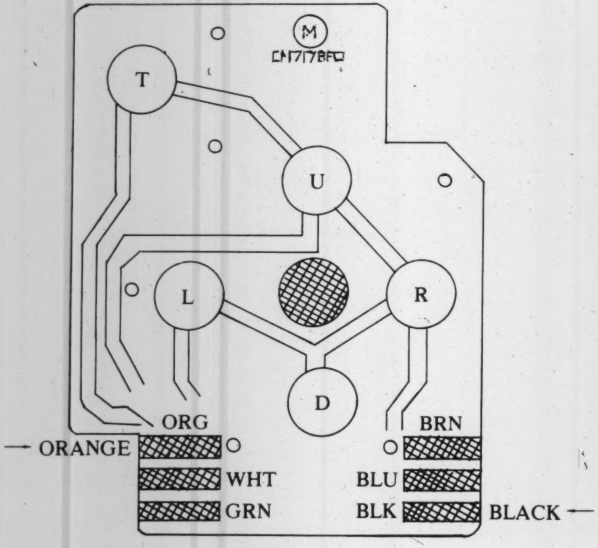


Figure 5. Second Trigger Wiring.

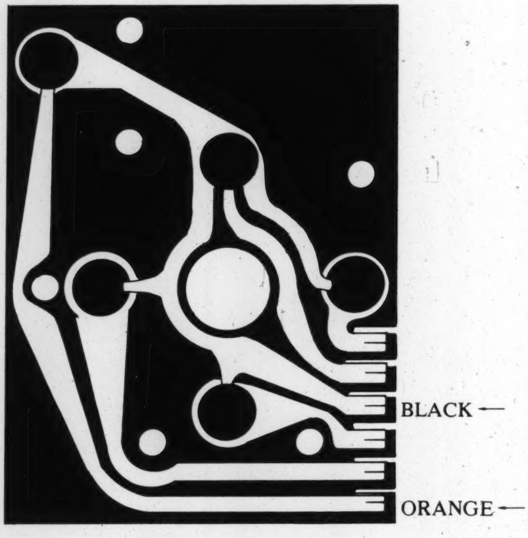
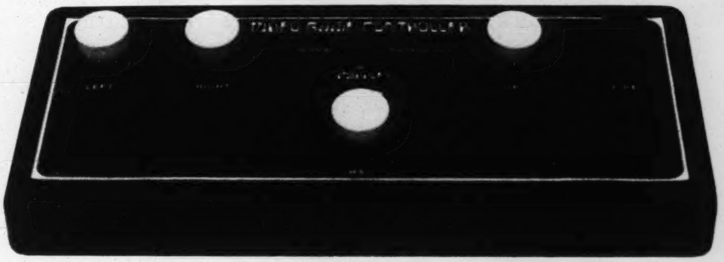


Figure 5A. New Style Stick.

Atari Game Controllers

If you like the idea of a pushbutton controller, but lack the time, talent, or inclination to construct one, you may want to purchase one of the ready-made controllers described below.



Starplex Controller

The Starplex controller from Starplex Electronics, offers an authentic "Asteroids-style" button configuration, as well as the fastest set of pushbuttons I have ever seen. In addition, an optional AA battery powers a "rapid-fire" mode, automatically repeating fire faster than you can do it by hand.

Because the pushbutton array is large and has a light touch, the controller takes a bit of getting used to. Eventually, however, I found that the lightning fast direction changes possible with Starplex resulted in higher scores.

It should be mentioned that because many games do not allow a new shot to be fired until an old one leaves the screen, the "rapid-fire" option will not always work optimally. Still, you can fire continuously merely by holding the button down, rather than having to re-press the trigger for each shot (or battery of shots). Over the long haul this reduces fatigue, and the incidence of "joystick elbow."

The unit lists for $29.95, which is a bargain for the most authentic game of Asteroids this side of the coin-op. It improved my score on several other games as well.

Starplex Electronics, Inc., E23301, Liberty Lake, WA 99019. (509) 924-3654.

KY Enterprises

The controller offered by KY Enterprises uses a directional-style configuration, less suitable for Asteroids but more versatile overall. For those unfamiliar with the arcade configuration, it is much easier to master this logical layout.

The unit exhibits extra sturdy construction—as if its makers knew it would have to withstand a few bounces off the floor. It is very large, and can be cradled or used on a tabletop by even the tiniest kids. The buttons themselves sit in raised collars, and, though not as fast as the buttons or the Starplex unit, appear to be the "regulation" coin-op standard. They are large and easy to control.

The KY Enterprises controller is priced at $26.95, and is available in left- or right-handed models. They also manufacture controllers for the handicapped.

KY Enterprises, 3039 East Second St., Long Beach, CA 90803.

Accu-Play

A third pushbutton controller, the Accu-Play Control Board, we did not have an opportunity to test. It sells for $29.95 from Accu-Tech Products, 10572 Swinden Ct., Cincinnati, OH 45241.

A sophisticated Z80™ based microcomputer training system.

Only $500.

THE FOX

The Fox is the most cost-effective and versatile microcomputer training system on the market today. At the heart of The Fox is a Z80 CPU, a chip which includes more capabilities than any other 8-bit microprocessor.

With a large memory capacity and sophistication found only in larger and more expensive units, The Fox is ideal for teaching microcomputer technology in schools, colleges and industrial training environments. Other features include extensive user prompting firmware, large digital readouts, power supply and exceptional versatility.

Compare The Fox with other low-cost microcomputers and you will agree that The Fox is the way to introduce microprocessing to your classroom, laboratory, office or home.

EDUCATORS! E&L also offers the MTP-80, a complete modular course in microcomputer technology which features The Fox.

Among the many features of The Fox are:

- Z80 CPU
- Low cost
- Large memory capacity
- Unlimited expansion with STD bus
- Serial and parallel I/O
- Large digital readouts
- Power supply included
- Solderless breadboarding area
- Stackable molded case with handle

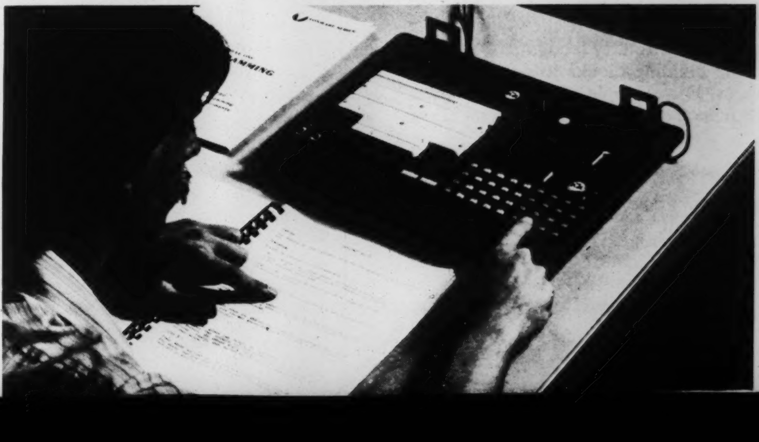
Call or write for complete information or the name of your local E&L dealer/representative.

E&L Instruments Incorporated
61 First Street, Derby, CT 06418
(203) 735-8774 Telex 963536

CIRCLE 162 ON READER SERVICE CARD

Price applies in U.S. only and is subject to change without notice.

™Z80 is a trademark of Zilog, Inc.



Part 2

Searching Techniques

Edward Mitchell

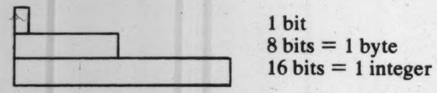
An Introduction to Data Structures

Part 1 of this four-part series introduced the concepts of algorithms and data structures. In this section we will explore several data structures in detail—*lists, stacks, queues, and trees*—and demonstrate their use in table searches, arithmetic expression evaluation, subroutine calls, simulations, process waiting areas in computer operating systems and in a typical application program. By choosing the correct form for the data in a problem, both memory requirements and execution time may be reduced.

This article introduces each of the data structures and illustrates some possible uses. A simple genealogical database is designed showing how tree structures and stacks are used in a real application. The program source listing for the genealogical database appears next month in Part 3. Also in Part 3, methods of programming the data structures in Basic are presented.

Data Structure Definition

A data structure is an organized collection of data. For our purposes, the smallest piece of data to be used is a simple character or integer, each made from some number of *bits* of storage. The bit, or binary 0 or 1, is the basic unit of computer memory. An integer in this article, and in many real computing systems, occupies 16 bits of storage. Most computers define a byte (usually equivalent to a single character such as A or B) as a sequence of eight bits. For example, a bit, a byte and an integer might be depicted as



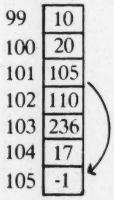
Typically, these are the fundamental storage units that the computer circuitry recognizes. The software manipulates the basic building blocks to develop more complex data structures. For example, a character string is little more than a sequence of characters strung together.

S	M	I	L	E

Similarly, an array of integers is just a sequence of integer storage locations.

101	5	73	67	13	8

The building blocks of characters and integers can be combined and referenced in numerous ways to form new data types. By treating the value of an integer as the address of another integer, a new type, called the *pointer* is created. For example, in the small section of memory shown below, the value of memory cell 101 is interpreted as the location or address of another cell.



99	10
100	20
101	105
102	110
103	236
104	17
105	-1

In this case, we say that cell 101 "points" to cell 105, hence the name "pointer."

By combining groups of characters, integers and pointers, new and complex data types are created.

By combining groups of characters, integers and pointers, new and complex data types are created. When collections of data types are brought together, they are called a *record*. Many languages, including Pascal, PL/1, Cobol, and Ada provide language support for record structures: Basic does not.

Edward Mitchell, 813 West Stevens Ave., # 1,
Santa Ana, CA 92707.

Not Even These Guys Can Promise Complete Protection

Does your insurance?
It's a startling fact, but most homeowners insurance doesn't cover home computers with business uses. That means your valuable investment could be unprotected even while you read this. Exposed to the risks of fire, theft, even accidental damage.

SAFEWARE™ does
Introducing SAFEWARE. The new insurance designed to protect your valuable investment when others won't. Regardless of use, SAFEWARE provides for full replacement coverage after a low $50 deductible. That includes all your hardware, media, even purchased software.

For just pennies a day
You can insure the average system for just pennies a day. Find the value of your system in the table below and see just how low the price for SAFEWARE protection really is. If you need higher limits, call us toll free for a low-cost quote.

Columbia National General Agency
New SAFEWARE insurance is underwritten by the American Druggists' Insurance Company, and is offered exclusively by Columbia National General Agency. Both companies are members of the Armco Insurance Group, one of the nation's leading property and casualty insurers.

For immediate coverage
No matter what the application, you can get immediate coverage for your system with the coupon below. Mail to: Columbia National General Agency, 88 East Broad Street, Columbus, Ohio 43215. 614/224-7235. Or call the toll free number for coverage today! 800/848-0598.

CNGA
COLUMBIA NATIONAL
GENERAL AGENCY

Amount of Insurance	Annual Premium
Up to $2,000	*$ 35*
$ 2,001-$ 5,000	*$ 60*
$ 5,001-$ 8,000	*$ 75*
$ 8,001-$11,000	*$ 90*
$11,001-$14,000	*$105*
$14,001-$17,000	*$125*

Not avail. in AL, AK, AZ, AR, DE, DC, GA, HI, ID, KY, LA, ME, MS, MT, NV, SC, SD, or WY.

Name
Street
City
State Zip
System value $
☐ Check enclosed ☐ VISA ☐ MasterCard
Card # Exp.
☐ Send additional information.

CC

CIRCLE 113 ON READER SERVICE CARD

Lists

A *list* is a sequence of memory cells linked together by pointers. The first group has a pointer to the second group, which in turn has a pointer to the third, and so on. The basic list structure is illustrated in Figure 1. The first element of the list is called the *head* and the last element is called the *tail*. New elements are inserted into the list by setting the appropriate pointers.

In Figure 1, much of memory is used for pointers and doesn't hold any data. However, by enlarging the data area, memory usage is improved. For example, a data type made from 16 characters and a pointer appears in Figure 2, where the ratio of useful data memory to pointer memory is much higher.

In Figure 1, the only way to get to element d is to start at the head of the list at a and traverse the pointers until arriving at d. As shown, the list is only traversed in the direction of the pointers. But by adding a new pointer to each list element, called a *backpointer*, the list can be traversed in either direction. Element c can then be reached by starting at the tail and traversing the list in the reverse direction.

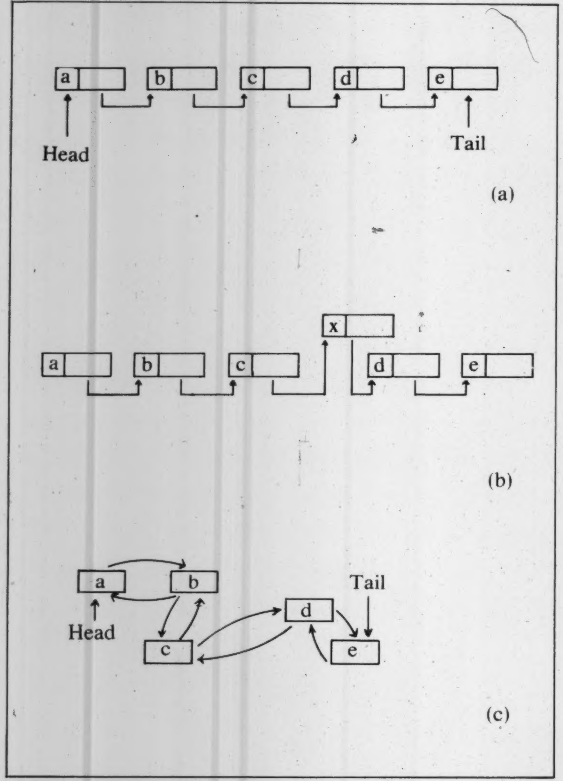


Figure 1. A list is a sequence of memory cells that are linked together. The first element is connected to the second, the second to the third, and so on, through the use of a pointer. (a) identifies the parts of a list structure. The first element is called the head while the last element is called the tail. New elements are easily inserted or deleted simply by changing the pointer connections, as shown at (b). (c) shows the addition of "backpointer" so that the list can be traversed in both directions.

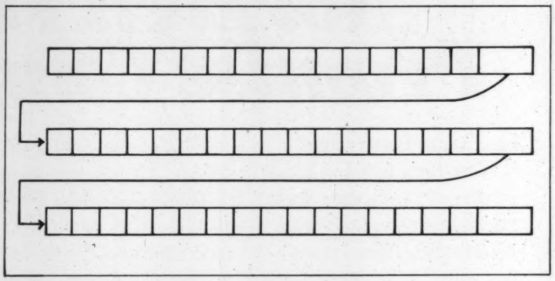
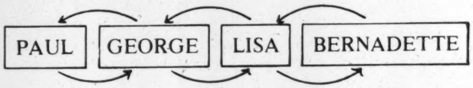


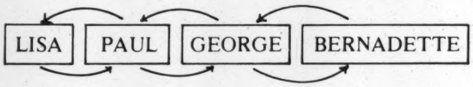
Figure 2. A problem with the list structure shown in Figure 1 is that much of the memory is used to hold pointers, rather than real data. However, if the data area for each element is enlarged, memory utilization can be improved. As shown here, when the data area per element is increased, the ratio of useful data memory to pointer memory is much higher. Of course, if the data area is not completely used, then memory utilization may still be poor.

Self-Organizing Lists

Lists are useful for tables that are subject to frequent changes. In Part 1, a self-organizing list structure was described as a way of sequentially searching a table ordered by the frequency of occurrence of each name. The list structure is well suited to constructing a self-organizing table. As names are added, they are attached at the head of the list. For example, when the name PAUL is added to a list already containing the names GEORGE, LISA, and BERNADETTE, the following list is produced,



To search the list for LISA, the names are examined in the sequence, PAUL, GEORGE, and finally LISA. Once LISA is found, the algorithm puts the name at the head of the list, giving,



Every time a name is found, it is relocated to the head of the list. Names that are accessed frequently stay near the front of the list, while seldom referenced names remain at the rear.

Stacks

Like the list, the *stack* is a structure that may grow and contract dynamically. Stacks are used for subroutine calls, recursive subroutine calls (recursive routines call themselves), arithmetic expression evaluation, sorting and searching algorithms and in many other applications. In some cases, the stack is like an array that grows in size at one end (See Figure 3). Data are always added to and removed from the top of the stack. Consequently, the most recent datum placed on the stack is also the first to be removed.

PERSONAL COMPUTERS PERSONAL COMPUTERS PERSONAL COMPUTERS

Amdek Video-300	149.00
Amdek Color-I Monitor	329.00
Atari 810 Disk Drive	449.00
Atari 800 16K	669.00
Daisywriter 2000	1049.00
Diablo 630	2095.00
Epson MX-80 w/Graftrax	439.00
Epson MX-80 FT w/Graftrax	549.00
Epson MX-100 FT Printer	695.00
Hayes Smartmodem	225.00
IDS 560 Paper Tiger	1099.00
IDS Prism 80 (Color)	1379.00
IDS Prism 132 (Color)	1559.00
Mannesmann Tally MT 1802	1499.00
Microtek 32K Ramboard for Atari 400 & 800	119.00
Microsoft Soft Card (Z-80)	279.00
Microsoft Soft Card Premium System for Apple	579.00
Microsoft Ramcard 64K for IBM-P.C.	369.00
NEC 3510 or 3530 Spinwriter	1675.00
NEC 7710 or 7730 Spinwriter	2295.00
NEC PC-8023 Printer	489.00
NEC GREEN JB1201M — 12″ Monitor	169.00
Okidata Microline — 80 Matrix Printer	329.00
Okidata Microline — 82A	449.00
Okidata Microline — 83A	729.00
Okidata Microline — 84 Parallel	1095.00
Sharp PC-1500 Pocket Computer	239.95
Sharp CE-150 Color Printer/Cassette I/F	199.95
Smith-Corona TP-1	649.00
Televideo 910	559.00
Televideo 925	725.00
Televideo 950	929.00
Videx Videoterm 80 Column Card for Apple II	259.00

OMEGA DELIVERS FOR LESS

OKIDATA MICROLINE 83A

EPSON MX-100 FT

YOUR CHOICE $695.00

SOFTWARE

Omega carries software by the following companies:
- American Business Systems • Ashton Tate • Dakin 5
- Innovative Software • Micropro • Microsoft
- Sorcim • Stoneware • Visicorp (Personal Software)

MAGNETIC MEDIA

Omega carries diskettes (5¼″ or 8″) by listed companies:
- Dysan • Maxell • Scotch • Verbatim

ACCESSORIES

Omega carries accessories for the Apple II by the following manufacturers:
- D.C. Hayes • Microsoft • Tymac
- M & R Enterprises • Videx

CALL TOLL FREE!

800-343-0873

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

We carry the complete line of Atari Hardware, Software & Peripherals.

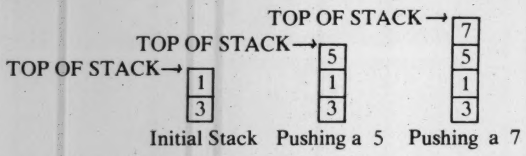
We will try to match or beat any price with similar purchase conditions.

OMEGA SALES COMPANY

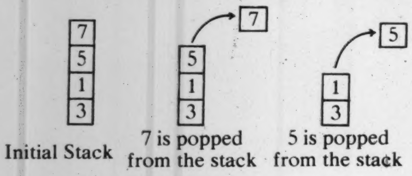
430 PEARL STREET, STOUGHTON, MA 02072
(617) 344-6645 TOLL FREE (800) 343-0873

CIRCLE 230 ON READER SERVICE CARD

Data are added by *pushing* a new element onto the stack. For example,


TOP OF STACK→
TOP OF STACK→
TOP OF STACK→
1
3
5
1
3
7
5
1
3
Initial Stack
Pushing a 5
Pushing a 7

Data are removed by *popping* them off the top of the stack.


7
5
1
3
Initial Stack
7
5
1
3
7 is popped from the stack
5
1
3
5 is popped from the stack

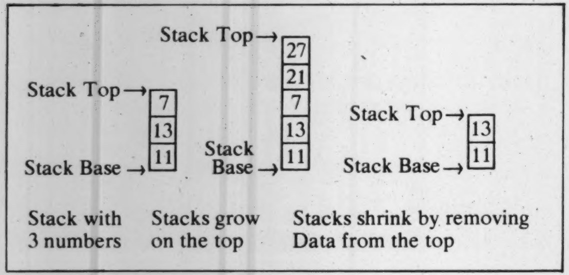
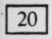

Stack Top→
7
13
11
Stack Base→
Stack with 3 numbers
Stack Top→
27
21
7
13
11
Stack Base→
Stacks grow on the top
Stack Top→
13
11
Stack Base→
Stacks shrink by removing Data from the top

Figure 3. The stack in operation. Data are added by pushing them on to the top of the stack. When data are removed they are popped off the top. Consequently the last number put on the stack is also the first to be removed.

Stacks and Subroutine Calls

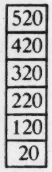
Figure 4 shows how stacks are used in subroutine calls. The Basic program shown in 4(a) calls a subroutine, which in turn calls another subroutine and so on. The output from this program is shown in 4(b).

When the program runs, the statement at line 10 calls the subroutine at line 100. When the subroutine at line 100 is completed, the program returns to line 20. Internally, the computer uses a stack to remember the return location. When it executes the GOSUB statement at line 10, it places line 20 on the stack as shown below:



The subroutine at line 100, in turn, calls the subroutine at line 200, placing the return location of 120 onto the stack.

By the time the program reaches line 600, the stack contains,


520
420
320
220
120
20

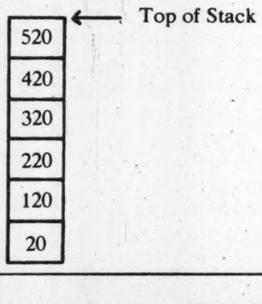
At line 610, the RETURN statement causes the subroutine to return to the line where it was called. So Basic pops the return address from the stack, yielding line 520. At line 520 another RETURN statement is executed, and again, the return address is popped. The program continues popping return addresses until it reaches the STOP at line 30.

```
10 GOSUB 100
20 PRINT "ALL DONE"
30 STOP
100 PRINT "AT SUBROUTINE 100"
110 GOSUB 200
120 PRINT "BACK FROM SUBROUTINE 200"
130 RETURN
200 PRINT "AT SUBROUTINE 200"
210 GOSUB 300
220 PRINT "BACK FROM SUBROUTINE 300"
230 RETURN
300 PRINT "AT SUBROUTINE 300"
310 GOSUB 400
320 PRINT "BACK FROM SUBROUTINE 400"
330 RETURN
400 PRINT "AT SUBROUTINE 400"
410 GOSUB 500
420 PRINT "BACK FROM SUBROUTINE 500"
430 RETURN
500 PRINT "AT SUBROUTINE 500"
510 GOSUB 600
520 PRINT "BACK FROM SUBROUTINE 600"
530 RETURN
600 PRINT "AT SUBROUTINE 600"
610 RETURN
```

4(a)

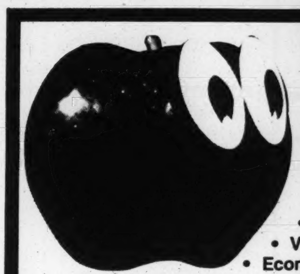
```
AT SUBROUTINE 100
AT SUBROUTINE 200
AT SUBROUTINE 300
AT SUBROUTINE 400
AT SUBROUTINE 500
AT SUBROUTINE 600
BACK FROM SUBROUTINE 600
BACK FROM SUBROUTINE 500
BACK FROM SUBROUTINE 400
BACK FROM SUBROUTINE 300
BACK FROM SUBROUTINE 200
ALL DONE
```

4(b)


Top of Stack
520
420
320
220
120
20

4(c)

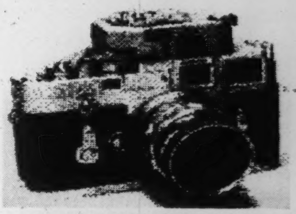
Figure 4. Using a stack for subroutines. When the program in (a) runs, it produces the output shown in (b). When the program reaches line 600 the stacks looks as in (c). The line numbers on the stack are the lines that Basic will go to after executing a RETURN statement. The stack allows the Basic program to jump to subroutines within subroutines without losing track of who called whom.



LET YOUR APPLE SEE THE WORLD!

The DS-65 Digisector® opens up a whole new world for your Apple II. Your computer can now be a part of the action, taking pictures to amuse your friends, watching your house while you're away, taking computer portraits . . . the applications abound! The DS-65 is a random access video digitizer. It converts a TV camera's output into digital information your computer can process. The DS-65 features:

- **High Resolution** — a 256 × 256 picture element scan
- **Precision** — 64 levels of grey scale
- **Versatility** — Accepts either NTSC or industrial video input
- **Economy** — A professional tool priced for the hobbyist



HI-RES PICTURE USING THE DS-65 AND PICTURE SCANNER SOFTWARE

The DS-65 is an intelligent peripheral card with on-board software in 2708 EPROM. Check these software features:

- Full screen scans directly to Apple Hi-Res screen
- Easy random access digitizing by Basic programs
- Line-scan digitizing for reading charts or tracking objects
- Utility functions for clearing and copying the Hi-Res screen

Use the DS-65 for precision security systems; computer portraiture; robotics; fast to slow scan conversion; moving target indicators; reading UPC codes, musical scores and paper tape and more! **GIVE YOUR APPLE THE GIFT OF SIGHT!** DS-65 Price: $349.95 / FSII Camera Price: $299.00 / Combination Price: $599.00

ADDITIONAL SOFTWARE FOR THE DS-65

—Picture Scanner: Provides a variety of different dithering algorithms for compressing the digitized image into the Hi-Res screen. Available on 13-sector disk. Price: $39.95

—Superscan: Enables you to enhance the DS-65's Hi-Res pictures with colors! Choose from 21 different colors and assign them to grey scale values, modify pictures, zoom, enhance contrast, etc. Print routines for the Anadex and Paper Tiger* are provided. Comes on a 13-sector disk. Written for The Micro Works by Magna Soft. Price: $79.95

—Portrait System Software: This program includes captions and a credit line, reverse printing for T-shirt application and the option to save portraits on disk. Specifically for use with a Malibu 165 printer. Call or write for more information.

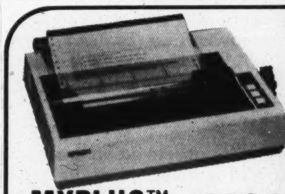
*Paper Tiger is a trademark of Integral Data Systems, Inc.

MasterCharge/Visa Accepted

THE MICRO WORKS

P.O. BOX 1110 DEL MAR, CA 92014 714-942-2400

CIRCLE 217 ON READER SERVICE CARD



MX-80 OWNERS

MXPLUS™ ADDS NEW CONVENIENCE

- PERF-SKIP TO **AUTOMATICALLY** GIVE YOU TOP AND BOTTOM MARGIN ON EACH PAGE. (SWITCH SELECTABLE, OF COURSE)
- MANUAL PRINT MODE CONTROL TO LET YOU SELECT CONDENSED, EMPHASIZED, OR NORMAL PRINTING **INSTANTLY** USING THE PRINTER PANEL BUTTONS.

MXPLUS™ INSTALLS IN MINUTES, NO SOLDERING!

MXPLUS IS A PLUG-IN MODULE FOR MX-80, MX-80F/T, AND MX-100 AND IS COMPATIBLE WITH GRAFTRAX AND ALL INTERFACE BOARDS. MXPLUS IS UNCONDITIONALLY GUARANTEED FOR 30 DAYS.

MX-80, MX-80 F/T, AND GRAFTRAX ARE TRADEMARKS OF EPSON

ORDER TODAY

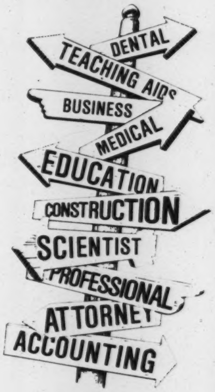
ORDERS CALL 24 HR. 800-835-2246 x441
INFORMATION CALL 213-969-2250

DRESSELHAUS COMPUTER PRODUCTS
22713 VENTURA BLVD., SUITE F
WOODLAND HILLS, CA 91364

ONLY **$49.95**

POSTPAID CALIF. ADD 6%
SAME DAY SHIPPING
WITH MC/VISA

CIRCLE 159 ON READER SERVICE CARD



GOING OUR WAY?

Quality Software for Apple II and Apple /// Computers

For FREE literature write to:

Monument
COMPUTER SERVICE
Village Data Center - P.O. Box 603 - Joshua Tree, CA 92252

For further information call (714) 365-6668.

CIRCLE 219 ON READER SERVICE CARD

Stacks and Expression Evaluation

Stacks are used during arithmetic expression evaluation to store temporary results. Users of reverse polish notation (RPN) calculators are familiar with the notion of stacks and their use to evaluate expressions. Pressing the ENTER key is synonymous with a push onto the stack.

Consider the expression (3+5)/(2+2). To solve, we add 3 and 5, giving 8, and then 2 and 2 giving 4. Then we divide 8 by 4 to give 2. During evaluation, two temporary solutions are obtained: (3+5) = 8 and (2+2) = 4. The expression might be expressed as

T1 = (3+5)
T2 = (2+2)
Answer = T1/T2

When the computer evaluates this expression, it uses a stack to store the temporary results.

Evaluating expressions by computer is quite complicated and is not described here (See Aho and Ullman [1977], Grappel, or Maurer). A *parser* must be constructed that distinguishes the precedence of arithmetic operations (e.g. multiply before adding). Because parsers are difficult to construct, we treat the parser as a black box that does the evaluation for us. Given the expression (3+5)/(2+2), the parser begins its work at the leftmost parenthesis. Seeing the number 3, the parser places 3 on the stack to give,

$$\boxed{3}$$

Next, it sees the "+" symbol and temporarily saves it as the arithmetic operator. Then the 5 is placed on the stack,

$$\begin{array}{|c|}\hline 5\\\hline 3\\\hline\end{array}$$

The operator "+" is applied to the top two elements of the stack to give,

$$\boxed{8}$$

(For those with RPN calculators, this is equivalent to the sequence 3, Enter, 5, +).

Recognizing that expressions within parentheses must be evaluated first, the parser scans to the next subexpression. Both 2s are placed onto the stack, giving

$$\begin{array}{|c|}\hline 2\\\hline 2\\\hline 8\\\hline\end{array}$$

and then added together to give,

$$\begin{array}{|c|}\hline 4\\\hline 8\\\hline\end{array}$$

Finally, the second number from the top of the stack is divided by the number on the top to produce the answer.

$$\boxed{2}$$

Queues

The line created by bank customers waiting for a teller is a *queue*. New customers (assuming that they are polite and do not cut in) arrive at the rear or tail of the line. When a teller is free, a customer leaves the front or head of the line, and advances to the teller window. In computer terms, a queue is a list in which new elements are always added to the tail and always removed from the head. A queue is shown in Figure 5. Elements are added to the queue as in 5(b) and removed as in 5(c).

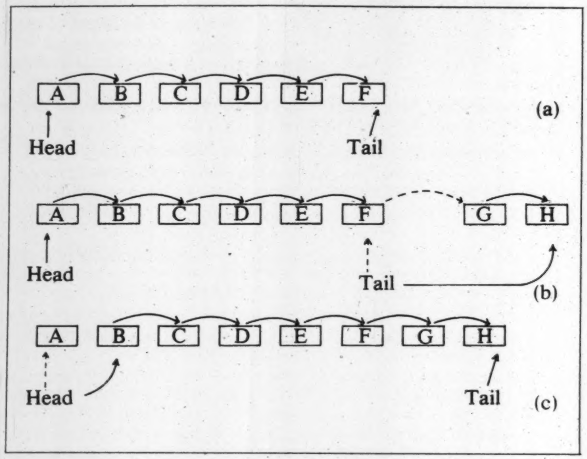


Figure 5. A queue is just like the line that customers form when waiting for service in a store. New customers wait at the end of the line while customers who have waited longest are served at the front. As a data structure, a queue is a list for which new items are always added at the tail and removed from the head. A queue is shown in (a), with A as the first element and F as the last. New elements are added at the tail, as illustrated in (b) showing the addition of two new elements G and H. Elements are always removed from the head of the queue and the head pointer is adjusted to point to the next element in the queue, as shown in (c).

Queues are often used in simulations to keep track of events. For example, in an airport simulation, aircraft are waiting for clearance to taxi to the runway, to take off, and to land. In a simulation, each of the holding points is represented by a queue structure (See Gorney [1979]) for more information about queues and simulations).

A queue is a list in which new elements are always added to the tail and always removed from the head.

In a multi-user computer system, several users may wish to print simultaneously on the single line printer attached to the system. Since the printer can only print one data file at a time, additional print requests are placed into a queue where they wait for processing by the printer.

GET FREE SOFTWARE FOR YOUR COMPUTER!

HOW? JUST ORDER ANY OF THE ITEMS BELOW, AND SELECT YOUR FREE SOFTWARE FROM THE BONUS SOFTWARE SECTION, USING THE FOLLOWING RULE: FOR THE FIRST $100.00 WORTH OF MERCHANDISE ORDERED TAKE 1 ITEM; FOR THE NEXT $200.00 WORTH OF MERCHANDISE ORDERED TAKE ANOTHER ITEM; FOR THE NEXT $300.00 TAKE A THIRD ITEM, ETC. ALL AT NO COST.

HARDWARE by APPLE COMPUTER

APPLE II + 48K	1199	PASCAL	150
FLOPPY DR. + CNTRLR	545	FLOPPY DRIVE	465
APPLE III. 128K	2999	PILOT	125

We carry the rest of the APPLE line at low. low prices! CALL!

OTHER HARDWARE for APPLE

D.C. HAYES:

Micromodem II	285	Smartmodem	225

MICROSOFT:

Z80 Softcard	269	16K Ramcard	139

MOUNTAIN COMPUTER:

Expansion Chassis	559	Music System	339
A/D + D/A Card	299	CPS Multi-function	169
X/10 Control Card	169	Super Talker	169

CALL FOR MORE PRICES! WE CARRY FULL LINE!

CALIFORNIA COMPUTER SYSTEMS:

Centronics Par. Int.	115	A/D Converter	105
Async. Serial Int.	135	Calendar/Clock	101

CALL FOR MORE PRICES! WE CARRY FULL LINE!

VIDEX:

80 Col. Bd. & Softswitch	235	Enhancer II	125
Enhancer I	105	Softswitch	29

MORE OTHER HARDWARE FOR APPLE:

SSM AIO-II	195	Keybd Co Num Keypad	129
SSM Serial AS10	115	Sunshine Joystick	39
SSM Par. AP10	99	Game Paddles	29
Novation Apple Cat	319	Shadow/Vet	885
Versawriter Tablet	249	SUP 'R' MOD	29
Prac. Periph. Microbuff (32K)	249	Prac. Periph. Microbuff (16K)	210

OTHER SOFTWARE for APPLE:

PERSONAL SOFTWARE/VISICORP:

Visicalc 3.3	195	Visifiles	199

CALL FOR MORE PRICES! WE CARRY FULL LINE!

MICROSOFT:

APPLE Fortran (Z80)	129	APPLE Cobol (Z80)	499
TASC Basic Compiler	139	MBASIC Compiler (Z80)	299
TIME Manager	125	MuMath	199
ALDS	99	M/SORT	149

MICRO-PRO:

Wordstar	225	Mail-Merge	99
Spellstar	149	Data-Star	199
Super-Sort	149	Calc-Star	149

PEACHTREE: BIZ Packages. all	199
CPA BIZ Packages. all	195

MORE OTHER SOFTWARE for APPLE:

DB Master	179	DB Master for CORVUS	399
Data Factory 5.0	239	PFS	85
ASCII Express	55	Dakin 5 Deprec. Planner	299
Sorcim Super Calc	189	Dakin 5 BIZ Bookkeeper	299
Howard Tax Prep	115	Broderbund Payroll	325
Howard Real Estate Anal	129	BPI Accounting Pkgs/ea	325

Synergistic "Data Reporter" Manages. Plots & Edits Data!	189

WORD-PROCESSORS & SPELLERS for APPLE:

Wordstar CP/M	225	EZWriter Prof. Sys	215
Magic Wand CP/M	299	MUSE Super Text 80	150
Executive Secretary	199	Wordpower	50
Letter Perfect	125	Hebrew II	55
Magic Window	85	Screenwriter II	110
Spellguard	219	Spellstar CP/M	149

Word Handler (Gives 80-Col. & Lower-Case with no board!)	199

PRINTERS

EPSON:

MX80	449	MX80 F/T	549
MX100 w/Graftrax	729	MX70 w/Graftrax	285
APPLE Intfce/Cbl	85	GRAFTRAX	60
GRAPPLER Intfc	149	2K Buffer Serial Card	135
MX80 Ribbon	15	MX100 Ribbon	24

C.ITOH:

F-10 Daisy Wheel (Par)	1495	F-10 Daisy Wheel (Ser)	1495
Pro-Writer (Par/Ser)	599	Pro-Writer (Par)	499
F-10 Tractor Option	225	Printer Interfaces	CALL

NEC:			
PC-8023A	495	NEC 7710 Daisy	2345
QUME:		**DIABLO:**	
SPRINT 9/45	1995	630 R/O	2099

OKIDATA:

Microline 82A	495	Microline 80	375
Microline Tractor	59	Okigraph I	79
Microline 83A	799	Microline 84 (Par)	1099

IDS:

560 with graphics	1095	Prism-Print Software	49
Prism 80 (Basic)	899	Prism 132 (Basic)	1050
Auto Sheet Feed	125	Prism Color	325
Sprint Mode (200 cps)	125	Dot Plot Graphics	85

ADD-ON MEMORY CARDS & DISK DRIVES FOR APPLE

MEMORY:

Microsoft 16K Ramcard	139	Saturn 32K Card	199
Legend 128K Ramcard	649	Saturn 64K Card	369
Legend 64K Ramcard	299	Saturn 128K Card	525
SVA 256K APL-Cache	1045	Prometheus 128K	439
AXLON 320K Ram Disk	1149	16K of 4116. 200 NS Mem	25

APPLE-COMPATIBLE FLOPPIES by MICRO-SCI:

With Controller:		No Controller:	
A35 Exact Replacement	460	A35 Exact Replacement	415
A40 40-Track	489	A40 40-Track	399
A70 70-Track	599	A70 70-Track	499

8" FLOPPY DISK SYSTEMS:

Vista Dual SSDD	1299	Vista Dual DSDD	1599
SVA AMS8000 Dual SSDD	1945	SVA AMS8000 Dual DSDD	2595
SVA ZVX4 Quad Cntrllr	495	SVA Disk 2 + 2 Cntrllr	359

CORVUS HARD DISKS:

6 MB Hard Disk	2249	Apple Interface	175
11 MB Hard Disk	3945	Other Computer Intfce	CALL
20 MB Hard Disk	4769	Mirror Back-Up	675

MONITORS. PLOTTERS & PERIPHERALS

MONITORS:

Zenith 12" Green	125	Zenith 13" Color	359
Amdek 12" Green	135	Amdek 13" Color	359
BMC 12" Green	119	BMC 12" Color	349
Electrohome RGB Intfce	275	Electrohome RGB 13" Clr	725

PLOTTERS:

Watanabe 1-Pen	1150	Watanabe 6-Pen	1400
Strobe Plotter 1-Pen	699	Strobel Apple Intfce	99
Houston Inst. DMP-3	929	Houston Inst. DMP-4	1185

OTHER PERIPHERALS:

Scott Shadow/VET	885	Street Echo II Synth	189
Votrax Type-N'-Talk	325	Computer Sta. Dithertizer	269
ALF 9-Voice Music Bd	155	Comp. Sta. Video Camera	375
ALF 3-Voice Music Bd	199	Comp. Stat. Both above	599

COMPUTER SYSTEMS

ATARI

ATARI 800 (16K)	629	ATARI 400 (16K)	335
810 Disk Drive	449	825 Printer	599
16K Ram Memory	89	850 Interface	159
Microsoft Basic	69	830 Modem	149
INTEC 32K Ram Memory	129	Telelink Cartridge	25
ATARI 800 (48K)	739	AXLON 128K Ram Disk	550
		ATARI 400 (48K)	435

OSBORNE

Osborne 1	1695	Printer Cable	55

XEROX

820-1 System w/5" Dr.	2450	820-2 System w/8" Dr.	2950
CP/M Op. Sys.	159	Wordstar	419
Super Calc	199	DIABLO 630 Printer	2099

Systems-Plus BIZ. SOFTWARE. PER MODULE	CALL!

NEC

Full Line at Low. Low Prices! CALL!

COMMODORE VIC

VIC 20 Computer	259	VIC 1515 Printer	335
VIC 1540 Disk Drive	499	VIC 1211A Supr-Expndr	59
VIC 1530 Datasette	69	VIC 1011A RS-232 Port	45

GENERAL CP/M SOFTWARE

MICROSOFT:

Basic 80	275	Edit 80	139
Basic Compiler	299	Mu Math/Mu Simp	199
Fortran 80	339	Mu Lisp/Mu Star	159
Cobol 80	499	M-Sort	128
Macro 80	139	Z-80 Softcard/Apple	269

MICROPRO:

Wordstar	275	Calcstar	199
Mailmerge	89	Supersort	165
Spellstar	165	Custom Notes	275
Datastar	239		

ASHTON-TATE:

dBASE II	475	dBASE II Guide	29

SORCIM:

Super Calc	189

FOX-GELLER:

Quickscreen	129	dUTIL	69

Quickcode (Writes programs for dBASE II)	199

ISA:

Spellguard	219	SP/LAW	99

PEACHTREE:

Gen. Ledger	399/40	Inventory	399/40
Acct. Rec.	399/40	Magicalc	269/25
Acct. Pay	399/40	Sales Invoicing	399/40
Payroll	399/40		

SYSTEMS PLUS

All Modules	415/EA

S-100 BOARDS

HAYES S-100 MODEM	325	HAYES SMARTMODEM	219
HAYES CHRONOGRAPH	189	CCS 64K RAM BOARD	525

FLOPPY DISKS

Elephant 5.25" Soft SSSD/bx	25	Elephant 8" Soft SSSD/6x	29
3M 5" Soft SSSD/bx	27	3M 8" Soft SSSD/bx	32
Maxell 5" Soft SSSD/bx	31	Maxell 8" Soft SSSD/bx	35
DYSAN 5" Soft SSSD/bx	37	DYSAN 8" Sof SSSD/bx	49

BONUS SOFTWARE SECTION!

Let us acquaint you with MESSAGE-MAKING SOFTWARE. Just place the disk in the APPLE. enter the text. and colorful. dynamic messages appear on the screens of TV sets connected to the computer. Use the software to broadcast messages on TV screens in schools. hospitals. factories. store window. exhibit booths. etc. The following program is our latest release:

SUPER MESSAGE: Creates messages in full-page "chunks". Each message allows statements of mixed typestyles. typesizes and colors. in mixed upper and lower case. Styles range from regular APPLE characters. up to double-size. double-width characters with a heavy, bold font. Six colors may be used for each different typestyle. Vertical and horizontal centering are available. and word-wrap is automatic. Users can chain pages together to make multi-page messages. Pages can be advanced manually or automatically. Multi-page messages can be stored to disc or recalled instantly.
REQUIRES 48K & ROM APPLESOFT . . . . $50.

APPLE PLOTS YOUR DATA & KEEPS YOUR RECORDS TOO! APPLE DATA GRAPH 2.1: Plots up to 3 superimposed curves on the Hi-res Screen both X & Y axes dimensioned. Each curve consists of up to 120 pieces of data. Graphs can be stored to disc and recalled immediately for updating. Up to 100 graphs can be stored on the same disc. Great for Stock-market Charting, Business Management, and Classroom instruction!
REQUIRES 48K & ROM APPLESOFT . . . . $35.

APPLE RECORD MANAGER: Allows complex files to be brought into memory so that record searches and manipulations are instantaneous. Records within any file can contain up to 20 fields, with user-defined headings. Information can be string or numeric. Users can browse thru files using page-forward, page-backward or random-search commands. Records can easily be searched, altered or sorted at will. Files can be stored on the same drive as the master program. or on another. if a second drive is available. Records of files can be printed. if desired. Additional modules coming are a STATISTICS INTERFACE. CHECKBOOK. MAILING LIST & DATA-ENTRY.
REQUIRES 48K & ROM APPLESOFT . . . . $40.

APPLE LITERATURE DATABASE: Allows rapid retrieval (via keywords) of references from total APPLE literature thru 1980. on 5.25" disk. Each entry in the data base consists of the article. author-name. periodical-name. date of issue. & page nos. The database is intended to support large magazine files which would require lengthy manual searching to recover information. Annual updates will be available.
REQUIRES 48K & ROM APPLESOFT . . . . $60.

WORDPOWER: Is a simple. powerful. low cost. line-oriented word-processor program. It offers a fast machine language FIND & REPLACE. Text can be listed to screen or printer. with or without line-numbers. Lower-case adaptors are supported. You can merge files. move groups of lines. and easily add. change. or delete lines. WORDPOWER can be used to create and maintain EXEC files. It can also be used as a rapid. unstructured. information-storage and retrieval system via its rapid search capabilities.
REQUIRES 48K & ROM APPLESOFT . . . . $50.

LABELMAKER: Allows users to quickly create address labels. A given label may be generated in any quantity from 1 to 32767. Space is allowed on labels for a personal and company name. but the space is automatically closed up if only a personal name is entered. Space is also allowed for foreign countries. The program can also generate labels for price-tags. part numbers and mail-messages such as "RUSH". "FRAGILE". etc. A self-incrementing feature allows theatre-tickets to be produced. with a date. and numbers running from a000 to z999. An editor is provided for editing labels prior to printing. All labels may be saved to disk for instant recall.
REQUIRES 48K & ROM APPLESOFT . . . . $35.

Above software for APPLE DOS 3.2/3.3 only. Call for BONUSES for other systems.

TO ORDER: Use phone or mail. We accept VISA, MASTERCARD, COD's, personal checks & money orders. Add 4% for credit card. Customer pays handling on COD orders. Foreign orders must be in American Dollars & include 10% for handling. Connecticut residents add 7.5% sales tax. Prices subject to change without notice.

Not responsible for typographical errors. Prices subject to change without notice

CONN. INFO. SYSTEMS CO.
(203) 579-0472
218 Huntington Road, Bridgeport, CT 06608

CIRCLE 145 ON READER SERVICE CARD

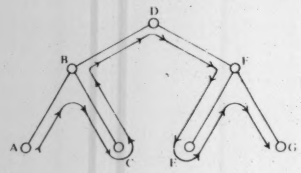
Trees

Trees are used to organize data for searching, to represent the syntactic structure of program inside compilers, and in database management systems. A family tree, illustrated in Figure 6(a) is a tree structure showing relationships among family members.

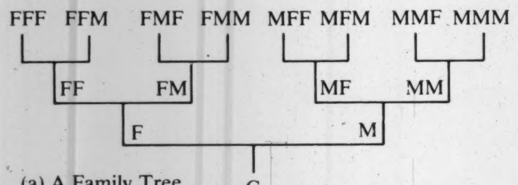
Each of the parts of the tree has a name, as shown in 6(b). Since the tree is upside down, the top point is called the *root*, and the lines issuing downward from the root are *branches*.

Each of the branching points is called a *node* while *leaves* are found at the extreme ends of the branches. A tree with two or fewer branches at each node is called a *binary tree*. Trees containing more than two branches do exist, but are not discussed here.

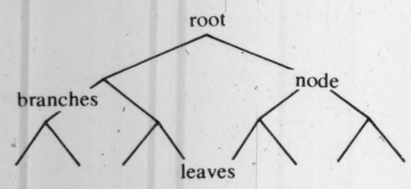
An ordered table could be represented as the tree shown below:



Traversing the branches of the tree as shown by the arrows, traces the table entries in alphabetical order: A, B, C, D, E, F, G. The symbol D at the root position is at the alphabetic center of the table. Referring to Algorithm 2 in Part 1, the ordered table binary search begins at the name in the middle of the table. Similarly, the root of the tree corresponds to the middle of the table and is used as the starting position for the binary tree search.



(a) A Family Tree



(b) A Data Structure Tree

Figure (6). The family tree in (a) shows the relationships among family members. The child, C, is at the root of the tree, with his parents just above. The child's father's father's father is shown at the extreme upper left. Similar relationships are shown elsewhere in the tree. In data structures, a tree is usually represented upside down, so that C would be on the top with his father and mother just beneath. At (b) the parts of a tree are labelled using data structure terminology.

Placing the names from Part 1, Figure 3 into a tree gives the structure shown in Figure 7. In Part 1, a detailed example was given to search for the name ERIC within an ordered table. That search began with the name ERIKA at the midpoint of the ordered table. Since ERIC was alphabetically less than ERIKA, all names greater than or equal to ERIKA could be removed from further consideration.

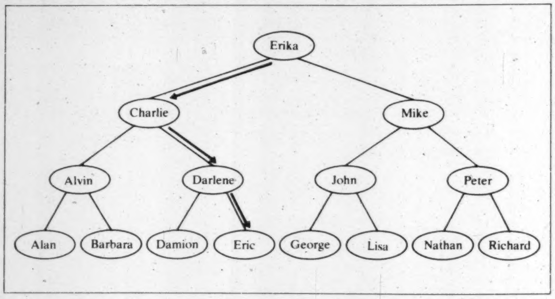
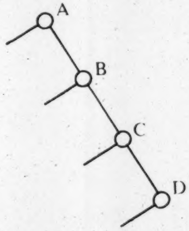


Figure 7. Searching a binary tree for ERIC. Starting at the root, ERIC is less than ERIKA so the name must lie along the left branch. But since ERIKA is greater than CHARLIE it must be to the right of CHARLIE. Eventually the search finds ERIC to the right of DARLENE in just four tries.

When the table is a tree structure, the binary search begins at the root of the tree, where ERIKA appears. Since the names appearing on the right branch from ERIKA are all alphabetically greater than ERIC, that entire branch may be removed from further consideration. The search then descends down the left branch to CHARLIE. Comparing CHARLIE to ERIC, the algorithm chooses the right sub-branch as the only possibility, so it descends to DARLENE. But since ERIC is greater than DARLENE, the search descends to the right where ERIC is found. The branches within the tree lead directly to the next guess, just as arithmetic is used to select the next guess when using the binary ordered table search.

Let's see what happens when we search for EDWARD, a name which does not appear in the tree. The search starts in the same way as does the search for ERIC, descending down the left branch from ERIKA to CHARLIE, from CHARLIE to DARLENE, and from DARLENE to ERIC. At ERIC the search tries the left but since the left branch doesn't exist, the algorithm concludes that EDWARD is not in the table.

Adding a name to the tree is simple. Since the algorithm expects to find EDWARD to the left of ERIC, it attaches a new leaf and places EDWARD at that point. If the names are entered into the tree in a bad order, such as alphabetical order, the tree can become extremely lopsided, taking on the appearance of a list:



Fortunately, Knuth has shown that if we assume the names to be entered in random order, the tree will probably organize into a structure that is close to being optimum.

A Practical Application

Genealogists often need to find the name, birth date, or place of birth of a distant ancestor. A question such as, "Who

Printer & Disk Drive Sale

Dot Matrix Printers

NEW EPSONS with GRAFTRAX-plus

Epson has improved and upgraded their best selling line of printers to include their new GRAFTRAX-plus graphics package. Features now include; 9 x 9 matrix, bi-directional/logic seeking, line spacing to n/216, programmable forms length and horizontal tabs, skip over perf, italics fonts, international symbols, superscript/subscript, normal, emphasized, double-strike, and double-emphasized print, underlining, line drawing graphics, 60/120 DPI bit image, software reset, adjustable right margin, and true back space.

MX-80 with GRAFTRAX-plus *80/132 column, 80 CPS, adjustable pin feed, parallel interface.*

PRM-28080	*MX-80 w/GRAFTRAX-plus*	**$479.95**

MX-80FT with GRAFTRAX-plus *same as MX-80 with friction feed and pin feed.*

PRM-28082	*MX-80FT w/GRAFTRAX-plus*	**$559.95**

MX-100 with GRAFTRAX-plus *132/232 column, correspondence quality, up to 15" paper, friction feed & adjustable pin feed, 18 x 18 dot matrix, 80 CPS.*

PRM-28100	*MX-100 w/GRAFTRAX-plus*	**$754.95**

PRA-27084	*Serial interface*	**$54.95**
PRA-27088	*Serial intf & 2K buffer*	**$99.95**
PRA-27081	*Apple card*	**$39.95**
PRA-27082	*Apple cable*	**$19.95**
PRA-27086	*IEEE 488 card*	**$59.95**
PRA-27087	*TRS-80 cable*	**$24.95**
PRA-27097	*GRAFTRAX-plus MX-80, FT*	**$59.95**
PRA-27197	*GRAFTRAX-plus MX-100*	**$64.95**
PRA-27090	*MX-80, FT print head*	**$44.95**
PRA-27190	*MX-100 print head*	**$49.95**
PRA-27083	*MX-80 ribbon cart.*	**$13.95**
PRA-27101	*MX-100 ribbon only*	**$9.95**

BETTER THAN EPSON ! - Okidata

Microline 82A *80/132 column,* ***120 CPS****, 9 x 9 dot matrix, friction feed, pin feed, adjustable tractor feed (optional), handles 4 part forms up to 9.5" wide, rear & bottom feed, paper tear bar, 100% duty cycle/200,000,000 character print head, bi-directional/logic seeking,* ***both serial & parallel interfaces included****, front panel switch & program control of 10 different form lengths, uses inexpensive spool type ribbons, double width & condensed characters, true lower case descenders & graphics*

PRM-43082	*Friction & pin feed*	**$499.95**

Microline 83A *132/232 column, 120 CPS, forms up to 15" wide, removable tractor, plus all the features of the 82A.*

PRM-43083	*with FREE tractor*	**$744.95**

Microline 84 *132/232 column, Hi-speed 200 CPS, full dot graphics built in, plus all the features of the 83A.*

PRM-43084	*Centronics parallel*	**$1149.95**
PRM-43085	*Serial with 2K buffer*	**$1249.95**
PRA-27081	*Apple card*	**$39.95**
PRA-27082	*Apple cable*	**$19.95**
PRA-27087	*TRS-80 cable*	**$24.95**
PRA-43081	*2K hi speed serial card*	**$99.95**
PRA-43082	*Hi-res graphics ROMs 82A*	**$49.95**
PRA-43083	*Hi-graphics ROMs 83A*	**$49.95**
PRA-43088	*Tractor option for 82A*	**$49.95**
PRA-43080	*Extra ribbons pkg. of 2*	**$9.95**

8023 DOT MATRIX - NEC

100 CPS, proportional spacing, hi-resolution graphics, correspondence quality printing, bi-directional tractor & friction feed.

NEC-8023A	*8023 parallel*	**$499.95**
NEC-8023-01	*8023 ribbon*	**$11.95**

PRINTER PALS - F.M.J. Inc.

Desk top printer stand and continuous form paper holder.

PRA-99080	*for MX-80, MX-80FT, Oki 82A, NEC*	**$29.95**
PRA-99100	*for MX-100, Oki 83A & 84*	**$34.95**
PRA-99700	*for letter quality printers*	**$49.95**

Jade Bus Probe

THE BUS PROBE - Jade

Inexpensive S-100 Diagnostic Analyzer

Double-high S-100 board which displays all 96 IEEE S-100 signals without the expense of an oscilloscope or a front panel

TSX-200B	*Bare board*	**$59.95**
TSX-200K	*Kit*	**$119.95**
TSX-200A	*A&T*	**$149.95**

Dual Disk Sub-Systems

Disk Sub-Systems - Jade

Handsome metal cabinet with proportionally balanced air flow system, rugged dual drive power supply, power cable kit, power switch, line cord, fuse holder, cooling fan, never-mar rubber feet, all necessary hardware to mount 2-8" disk drives, power supply, and fan, does not include signal cable.

Dual 8" Sub-Assembly Cabinet

END-000420	*Bare cabinet*	**$59.95**
END-000421	*Cabinet kit*	**$225.00**
END-000431	*A & T*	**$359.95**

8" Sub-Systems - Single Sided, Double Density

END-000423	*Kit w/2 FD100-8Ds*	**$975.00**
END-000424	*A & T w/2 FD100-8Ds*	**$1175.00**
END-000433	*Kit w/2 SA-801Rs*	**$999.95**
END-000434	*A & T w/2 SA-801Rs*	**$1195.00**

8" Sub-Systems - Double Sided, Double Density

END-000426	*Kit w/2 DT-8s*	**$1224.95**
END-000427	*A & T w/2 DT-8s*	**$1424.95**
END-000436	*Kit w/2 SA-851Rs*	**$1274.95**
END-000437	*A & T w/2 SA-851Rs*	**$1474.95**

5¼" Disk Drives

Tandon TM100-1 *single-sided double-density 48 TPI*		
MSM-551001	$248.95 ea	2 for **$219.95 ea**
Shugart SA400L *single-sided double-density 40 track*		
MSM-104000	$234.95 ea	2 for **$224.95 ea**
Shugart SA455 *half-size double-sided 48 TPI*		
MSM-104550	$349.95 ea	2 for **$329.95 ea**
Shugart SA465 *half-size doule-sided 96 TPI*		
MSM-104650	$399.95 ea	2 for **$379.95 ea**
Tandon TM100-2 *double-sided double-density 48 TPI*		
MSM-551002	$324.95 ea	2 for **$298.95 ea**
Shugart SA450 *double-sided double-density 35 track*		
MSM-104500	$349.95 ea	2 for **$329.95 ea**
Tandon TM100-3 *single-sided double-density 96 TPI*		
MSM-551003	$324.95 ea	2 for **$298.95 ea**
Tandon TM100-4 *double-sided double-density 96 TPI*		
MSM-551004	$448.95 ea	2 for **$419.95 ea**
MPI B-51 *single-sided double-density 40 track*		
MSM-155100	$234.95 ea	2 for **$224.95 ea**
MPI B-52 *double-sided double-density 40 track*		
MSM-155200	$344.95 ea	2 for **$334.95 ea**
MPI B-91 *single-sided double-density 77 track*		
MSM-155300	$369.95 ea	2 for **$359.95 ea**
MPI B-92 *double-sided double-density 77 track*		
MSM-155400	$469.95 ea	2 for **$459.95 ea**

5¼" Cabinets with Power Supply

END-000216	*Single cab w/power supply*	**$69.95**
END-000226	*Dual cab w/power supply*	**$94.95**

8" Disk Drives

Shugart SA810 *half-size single-sided double-density*		
MSF-108100	$424.95 ea	2 for **$394.95 ea**
Shugart SA860 *half-size double-sided double-density*		
MSF-108600	$574.95 ea	2 for **$549.95 ea**
Shugart SA801R *single-sided double-density*		
MSF-10801R	$394.95 ea	2 for **$389.95 ea**
Shugart SA851R *double-sided double-density*		
MSF-10851R	$554.95 ea	2 for **$529.95 ea**
Tandon TM848-1 *single-sided double-den thin-line*		
MSF-558481	$424.95 ea	2 for **$394.95 ea**
Tandon TM848-2 *double-sided double-den thin-line*		
MSF-558482	$574.95 ea	2 for **$549.95 ea**
Qume DT-8 *double-sided double-density*		
MSF-750080	$524.95 ea	2 for **$498.95 ea**
Mitsubishi M2894-63 *double-sided double-density*		
MSF-289463	$549.95 ea	2 for **$524.95 ea**
Siemens FDD 100-8 *single-sided double-density*		
MSF-201120	$334.95 ea	2 for **$349.95 ea**

Prices may be slightly higher at our retail locations. Please contact the store in your area for exact pricing.

Hard Disk Drives

12 MEGABYTE SUB–SYSTEM - DayStar

12 Megabyte Winchester sub-system for most CP/M based microcomputers including Apple II, S-100, IBM PC, NEC, Xerox, TRS-80 II, Heath H-89, and others. Sub-system includes interface, controller, cabinet, power supply, CP/M software patch, & cables - ready to just plug in and run. A 1 Megabyte back-up drive is also available.

MSH-531010	*S-100 sub-system*	**$2095.00**
MSH-531020	*Apple II sub-system*	**$2095.00**
MSH-531030	*NEC sub-system*	**$2095.00**
MSH-531040	*Xerox sub-system*	**$2095.00**
MSH-531050	*TRS-80 II sub-system*	**$2095.00**
MSH-531060	*IBM PC sub-system*	**$2095.00**
MSH-531099	*1 Megabyte back-up*	**$699.95**

12 MEGABYTE WINCHESTER - Tandon

5¼" hard disk drive for hi-speed mass storage.

MSH-550603	*Bare 5¼" drive*	**$1094.95**

Letter Quality Printers

TP-1 LETTER QUALITY - SCM

10 CPS daisy wheel printer from Smith Corona.

PRD-45101	*Centronics parallel*	**$699.95**
PRD-45102	*Rs-232C serial*	**$749.95**

LETTER QUALITY PRINTER - Jade

Uses standard daisy wheels and ribbon cartridges, 16 CPS bi-directional printing, semi-automatic paper loader (single sheet or fan fold), 10/12/15 pitch, up to 16" paper, built-in noise suppression cover.

PRD-11001	*Centronics parallel*	**$959.95**
PRD-11002	*RS-232C serial model*	**$999.95**

STARWRITER F-10 - C. Itoh

New 40 CPS daisy wheel printer with full 15" carriage, uses standard Diablo print wheels and ribbons, both parallel and serial interfaces included.

PRD-22010	*Starwriter F-10*	**$1495.95**

80 CPS LETTER QUALITY - Fujitsu

High speed daisy wheel printer with both RS-232C serial & Centronics parallel interfaces, emulates NEC 5510, Diablo 630, Qume, and will interface to the IBM Personal Computer, features include Z-80 CPU, 16K buffer (48K optional), bi-directional printing, & baud rates up to 19.2K

PRD-86100	*Fujitsu with 16K*	**$2895.00**
PRD-86200	*Fujitsu with 48K*	**$3195.00**
PRA-86000	*Adjustable tractor*	**$190.00**

Software

PLANNER CALC - Target Software

Spread sheet (what if ?) program designed with the user in mind, user oriented (simple english) commands allow you to quickly master this powerful software package, supplied on disk for most CP/M based systems.

SFA-12251052M	*Apple II 5¼" CP/M*	**$49.95**
SFC-12251050F	*SS SD 8" CP/M*	**$49.95**
SFC-12251053F	*Xerox 8" CP/M*	**$49.95**
SFC-12251053M	*Xerox 5¼" CP/M*	**$49.95**
SFX-12251051M	*NEC 5¼" CP/M*	**$49.95**

PAC MAN - Atari

Atari's best selling game for your 800 or 400 computer.

SFI-31254022E	*Pac Man cartridge*	**$37.95**

Place Orders Toll Free

Continental U.S.	*Inside California*
800-421-5500	800-262-1710

For Technical Inquires or Customer Service call:

213-973-7707

JADE

Computer Products

4901 W. Rosecrans, Hawthorne, Ca 90250

TERMS of SALE: Cash, checks, credit cards, or Purchase Orders from qualified firms and institutions. **Minimum Order $15.00.** California residents add 6% tax. Minimum shipping & handling charge $3.00. **Pricing & avâilibility subject to change**

CIRCLE 184 ON READER SERVICE CARD

Disk Drive for Apple $319.95

Diskettes

PREMIUM DISKETTES - Jade

We proudly put our name on these high quality diskettes -

5¼" Diskettes, Box of Ten

MMD-5110103	*SS, SD, 01S*	**$29.00**
MMD-5111003	*SS, SD, 10S*	**$29.00**
MMD-5111603	*SS, SD, 16S*	**$29.00**
MMD-5120103	*SS, DD, 01S*	**$31.00**
MMD-5121003	*SS, DD, 010*	**$31.00**
MMD-5121603	*SS, DD, 16S*	**$31.00**

8" Diskettes, Box of Ten

MMD-8110103	*SS, SD, 01S*	**$31.00**
MMD-8120103	*SS, DD, 01S*	**$39.00**
MMD-8220103	*DS, DD, 01S*	**$48.00**

BARGAIN DISKETTES

MMD-5110105	*5¼" SS, DD, 01S*	**$19.95**
MMD-5220105	*5¼" DS, DD, 01S*	**$32.95**
MMD-8110105	*8" SS, SD, 01S*	**$24.95**
MMD-8120105	*8" SS, DD, 01S*	**$32.95**
MMD-8220105	*8" SS, DD, 01S*	**$35.95**

Video Monitors

HI-RES 12" GREEN - Zenith

15 MHz bandwith 700 lines/inch, P31 green phosphor, switchable 40 or 80 columns, small, light-weight & portable.

VDM-201201	*List price $189.95*	**$129.95**

12" GREEN SCREEN - NEC

20 MHz bandwidth, P31 phosphor ultra-high resolution video monitor with audio.

VDM-561200	*List price $289.95*	**$199.95**

12" COLOR MONITOR - NEC

High resolution color monitor with audio.

VDC-651212	*Color monitor*	**$389.95**
NEC-1202D	*RGB color monitor*	**$999.95**

13" COLOR MONITORS - BMC

18 MHz RGB & composite video color monitors.

VDC-421320	*13" RGB Color*	**$329.95**
VDC-421310	*13" Composite video*	**$299.95**
VDX-420090	*RGB card for Apple*	**$149.95**

COLOR MONITORS - Amdek

Reasonably priced color video monitors.

VDC-80130	*13" Color I*	**$379.95**
VDC-801320	*13" Color II*	**$894.95**
IOV-2300A	*DVM board for Apple*	**$199.95**

AMBER or GREEN MONITORS - Jade

High resolution 18 MHz compact video monitors.

VDM-751210	*12" Amber phosphor*	**$149.95**
VDM-751220	*12" Green phosphor*	**$139.95**
VDM-750910	*9" Amber phosphor*	**$149.95**
VDM-750920	*9" Green phosphor*	**$139.95**

Modems

SIGNALMAN - Anchor

Direct-connect automatic answer/originate selection, 300 Baud full duplex, Bell 103, includes RS-232 cable

IOM-5600A	*Signalman*	**$98.50**

SMARTMODEM - Hayes

Sophisticated direct-connect auto-answer/auto-dial modem, touch-tone or pulse dialing, RS-232C interface, programmable

IOM-5400A	*Smartmodem*	**$248.95**
IOK-1500A	*Hayes Chronograph*	**$218.95**
IOM-2010A	*Micromodem II*	**$328.95**
IOM-1100A	*Micromodem 100*	**$368.95**

EPROM Erasers

ULTRA-VIOLET EPROM ERASERS

Inexpensive erasers for industry or home.

XME-3100A	*Spectronics w/o timer*	**$69.50**
XME-3101A	*Spectronics with timer*	**$94.50**
XME-3200A	*Economy model*	**$39.95**

Single User System

THREE BOARD SET - SD Systems

4 MHz Z-80A CPU, 64K RAM (optional 256K), serial I/O port, parallel I/O port, double density disk controller, CP/M 2.2 & manual set, system monitor, control & diagnostic software. Includes SBC-200, 64K ExpandoRAM II, Versafloppy II, & CP/M 2.2 - all boards are assembled & tested.

Board set with 64K of RAM	**$1095.00**
Board set with 256K of RAM	**$1295.00**

Apple II Accessories

16K RAM CARD - for Apple II

Expand your Apple to 64K, 1 year warranty

MEX-16700A	*Save $125.00 !!!*	**$69.95**

ADD-ON DISK DRIVE - for Apple II

Inexpensive direct replacement for Apple Disk II, works with Apple II controller as first or second drive.

MSM-123200	*Add On Drive*	**$319.95**
MSM-123100	*Controller*	**$94.95**

Z-80 CPU CARD - for Apple II

Two computers in one, Z-80 & 6502, more than doubles the power and potential of your Apple, includes Z-80 CPU card CP/M and complete manual set.

CPX-62800A	*A & T with software*	**$249.95**

8" DISK CONTROLLER - Vista

New from Vista Computer, single or double sided, single or double density, compatible with DOS 3.2/3.3, Pascal, & CP/M 2.2, Shugart & Qume compatible

IOD-2700A	*A & T*	**$499.95**

2 MEGABYTES for Apple II

Complete package includes: Two 8" double-density disk drives, Vista double-density 8" disk controller, cabinet, power supply, & cables, DOS 3.2/3.3, CP/M 2.2, & Pascal compatible.

1 MegaByte Package	*Kit*	**$1495.00**
1 MegaByte Package	*A & T*	**$1695.00**
2 MegaByte Package	*Kit*	**$1795.00**
2 MegaByte Package	*A & T*	**$1995.95**

APPLE-CAT - Novation

Software selectable 1200 or 300 baud, direct connect, auto-answer/auto-dial, auxiliary 3-wire RS232C serial port for printer.

IOM-5232A	*Save $50.00!!!*	**$325.95**

VISION 80 - Vista Computer

80 column x 24 line video card for Apple II, 128 ASCII characters, upper and lower case, 9 x 10 dot matrix with 3 dot descenders, standard data media terminal control codes, CP/M Pascal & Fortran compatible, 50/60 Hz

IOV-2400A	*Vista Vision 80*	**$299.95**

CPS MULTICARD - Mtn. Computer

Three cards in one! Real time clock/calendar, serial interface, & parallel interface - all on one card.

IOX-2300A	*A & T*	**$179.95**

HI-RES GRAPHICS CARD - Genie

Intelligent printer interface and control card allows full high resolution graphics and screen dumps.

IOP-2405A	*Genie for Epson*	**$119.95**
IOP-2410A	*Genie for Okidata*	**$119.95**
IOP-2415A	*Genie for NEC/C. Itoh*	**$119.95**

Power Strips

ISOBAR - GSC

Isolates & protects your valuable equipment from high voltage spikes & AC line noise, inductive isolated ground, 15 amp circuit breaker, U.L. listed

EME-115103	*3 socket*	**$39.50**
EME-115105	*4 socket*	**$49.50**
EME-115100	*8 socket*	**$54.50**
EME-115110	*9 socket rackmount*	**$74.50**

Single Board Computer

SUPERQUAD - Adv. Micro Digital

Single board, standard size S-100 computer system, 4 MHz Z-80A, single or double density disk controller for 5¼" or 8" drives, 64K RAM, extended addressing, up to 4K of EPROM, 2 serial & 2 parallel I/O ports, real time interrupt clock, CP/M compatible.

CPC-30800A	*A & T*	**$724.95**
IOX-4232A	*Serial I/O adapter*	**$29.95**

Z-80 STARTER KIT - SD Systems

Complete Z-80 microcomputer with RAM, ROM, I/O, keyboard, display, kludge area, manual, & workbook.

CPS-30100K	*Kit with workbook*	**$299.95**
CPS-30100A	*A & T with workbook*	**$469.95**

AIM-65 - Rockwell International

Complete 6502 microcomputer with alphanumeric display, printer, keyboard, & instruction manual.

CPK-50165A	*1K AIM-65*	**$424.95**
CPK-50465A	*4K AIM-65*	**$474.95**
SFK-74600008E	*8K Basic ROM*	**$64.95**
SFK-64600004E	*4K assembler ROM*	**$43.95**
SFK-74600020E	*PL/65 ROM*	**$84.95**
SFK-74600010E	*Forth ROM*	**$64.95**
SFK-74600030E	*Instant Pascal*	**$99.95**
PSX-030A	*Power supply*	**$64.95**
ENX-000002	*Enclosure*	**$54.95**

SPECIAL PACKAGE

4K AIM-65, 8K Basic, power supply, & enclosure

Special Package Price	**$649.95**

S-100 EPROM Boards

PROM-100 - SD Systems

2708, 2716, 2732 EPROM programmer with software.

MEM-99520K	*Kit with software*	**$189.95**
MEM-99520A	*A & T with software*	**$249.95**

PB-1 - SSM Microcomputer

2708, 2716 EPROM board with on-board programmer.

MEM-99510K	*Kit with manual*	**$154.95**
MEM-99510A	*A & T with manual*	**$219.95**

EPROM BOARD - Jade

16K or 32K uses 2708 or 2716 EPROMs, 1K boundary.

MEM-16230K	*Kit w/o EPROMs*	**$79.95**
MEM-16230A	*A & T w/o EPROMs*	**$119.95**

S-100 Video Boards

SPECTRUM COLOR - CompuPro

Full-function color graphics board, up to 8 colors, 256 x 192 graphics, parallel I/O port, 8K RAM.

IOV-1870A	*A & T*	**$348.95**
IOV-1870C	*CSC*	**$398.95**

MICROANGELO - Scion

Ultra-high-resolution 512 x 480, 256 color or black & white S-100 video board

IOV-1500A	*A & T*	**$999.95**

S-100 MotherBoards

ISO-BUS - Jade

Silent, simple, and on sale - a better motherboard

6 Slot (5¼" x 8⅝")

MBS-061B	*Bare board*	**$19.95**
MBS-061K	*Kit*	**$39.95**
MBS-061A	*A & T*	**$59.95**

12 Slot (9¾" x 8⅝")

MBS-121B	*Bare board*	**$29.95**
MBS-121K	*Kit*	**$69.95**
MBS-121A	*A & T*	**$99.95**

18 Slot (14½" x 8⅝")

MBS-181B	*Bare board*	**$49.95**
MBS-181K	*Kit*	**$99.95**
MBS-181A	*A & T*	**$139.95**

ACTIVE TERMINATOR - CompuPro

A true mother's helper.

TSX-100A	*A & T*	**$59.45**

Prices may be slightly higher at our retail locations. Please call the store nearest you for local price and availability.

CompuPro Boards on Sale

S-100 CPU Boards

8086/8087 - CompuPro

16 bit, 8 or 10 MHz 8086 CPU with provisions for 8087 & 80130.

CPU-70520A	*8 MHz 8086 A & T*	**$624.95**
CPU-70520C	*8 MHz 8086 CSC*	**$764.95**
CPU-70530A	*with 8087 A & T*	**$1224.95**
CPU-70530C	*with 8087 CSC*	**$1455.95**

8085/8086 - CompuPro

Both 8 & 16 bit CPUs, standard 8 bit S-100 bus, up to 8 MHz, accesses 16 Megabytes of memory.

CPU-20510A	*6 MHz A & T*	**$398.95**
CPU-20510C	*6/8 MHz CSC*	**$497.95**

CPU-Z - CompuPro

2/4 MHz Z80A CPU, 24 bit addressing.

CPU-30500A	*2/4 MHz A & T*	**$279.95**
CPU-30500C	*3/6 MHz CSC*	**$374.95**

SBC-200 - SD Systems

4 MHz Z-80A CPU with serial & parallel I/O, 1K RAM, 8K ROM space, monitor PROM included.

CPC-30200A	*A & T*	**$399.95**

THE BIG Z - Jade

2 or 4 MHz switchable Z-80 CPU board with serial I/O, accomodates 2708, 2716, or 2732 EPROM, baud rates from 75 to 9600.

CPU-30201B	*Bare board w/manual*	**$35.00**
CPU-30201K	*Kit with manual*	**$149.95**
CPU-30210A	*A & T with manual*	**$199.95**

CB-2 - SSM Microcomputer

2 or 4 MHz Z-80 CPU board with provision for up to 8K of ROM or 4K of RAM on board, extended addressing, IEEE S-100, front panel compatible.

CPU-30300K	*Kit with manual*	**$229.95**
CPU-30300A	*A & T with manual*	**$274.95**

2810 Z-80 CPU - C.C.S.

2 or 4 MHZ Z-80 CPU with serial I/O port & on-board monitor PROM, front panel compatible.

CPU-30400A	*A & T with PROM*	**$289.95**

2820 Z-80 DMA CPU - C.C.S.

4 MHz Z-80 CPU board with 2 serial I/O ports & Centronics parallel I/O port, separate data & status ports, DMA daisy chain compatible.

CPU-30420A	*A & T with manual*	**$569.95**

S-100 Disk Controllers

DISK 1 - CompuPro

8" or 5¼" DMA disk controller, single or double density, single or double sided, 10 MHz.

IOD-1810A	*A & T*	**$449.95**
IOD-1810C	*CSC*	**$554.95**
SFC-52506580F	*8" CP/M 2.2 for Z-80*	**$174.95**
SFC-52506586F	*8" CP/M 2.2 for 8086*	**$299.95**
SFO-54158000F	*Oasis single user*	**$499.95**
SFO-54158002F	*Oasis multi-user*	**$849.95**

VERSAFLOPPY II - SD Systems

Double density disk controller for any combination of 5¼" and 8" single or double sided, analog phase-locked loop data separator, vectored interrupts, CP/M 2.2 & Oasis compatible, control/diagnostic software PROM included.

IOD-1160A	*A & T with PROM*	**$359.95**
SFC-55009047F	*CP/M 2.2 with VF II*	**$99.95**

2242 DISK CONTROLLER - C.C.S.

5¼" or 8" double density disk controller with on-board boot loader ROM, free CP/M 2.2 & manual set.

IOD-1300A	*A & T with CP/M 2.2*	**$399.95**

DOUBLE D - Jade

High reliablity double density disk controller with on-board Z-80A, auxiliary printer port, IEEE S-100, can function in multi-user interrupt driven bus.

IOD-1200B	*Bare board & hdwr man*	**$59.95**
IOD-1200K	*Kit w/hdwr & sftwr man*	**$299.95**
IOD-1200A	*A & T w/hdwr & sftwr man*	**$359.95**
SFC-59002001F	*CP/M 2.2 with Double D*	**$99.95**

S-100 Memory Boards

256K RAMDISK - SD Systems

ExpandoRAM III expandable from 64K to 256K using 64K x 1 RAM chips, compatible with CP/M, MP/M, Oasis, Cromemco, & most other Z-80 based systems, functions as ultra-high speed disk drive when used with optional RAMDISK software.

MEM-65064A	*64K A & T*	**$474.95**
MEM-65128A	*128K A & T*	**$574.95**
MEM-65192A	*192K A & T*	**$674.95**
MEM-65256A	*256K A & T*	**$774.95**
SFC-55009000F	*RAMDISK sftwr CP/M 2.2*	**$44.95**
SFC-55009000F	*RAMDISK with EXRAM III*	**$24.95**

128K RAM 21 - CompuPro

128K x 8 bit or 64K x 16 bit static RAM board, 12 MHz, 24 bit addressing.

MEM-12810A	*A & T*	**$1609.95**
MEM-12810C	*CSC*	**$1794.95**

64K RAM 17 - CompuPro

64K CMOS static RAM board, 10 MHz, low power less than 4 watts, DMA compatible, 24 bit addressing.

MEM-64180A	*64K A & T*	**$549.95**
MEM-64180C	*64K CSC*	**$698.95**

64K RAM 16 - CompuPro

32K x 16 bit or 64K x 8 bit low power static RAM board, 10 MHz, 24 bit addressing.

MEM-32180A	*RAM 16 A & T*	**$598.95**
MEM-32180C	*RAM 16 CSC*	**$698.95**

64K STATIC RAM - SSM

IEEE 696/S-100 standard, up to 6MHz/8 Bit, 12MHz/16 Bit, 24 Bit extended addressing, disable-able in 2K increments

MEM-64300A	*A & T*	**$499.95**

64K STATIC RAM - Mem Merchant

64K static S-100 RAM card, 4 to 16K banks up to 8 MHz.

MEM-64400A	*64K A & T*	**$499.95**

2065 64K RAM - C.C.S.

4 MHz bank port/bank byte selectable, extended addressing, 16K bank selectable, front panel compatible.

MEM-64565A	*64K A & T*	**$349.95**

2066 64K RAM - C.C.S.

64K RAM board with bank and block select switching functions for Cromemeco Cromix & Alpha Micro.

MEM-64566A	*64K A & T*	**$424.95**

64K EXPANDORAM II - SD Systems

Expandable RAM board from 16K to 64K using 4116 RAM chips.

MEM-16630A	*16K A & T*	**$344.95**
MEM-32631A	*32K A & T*	**$364.95**
MEM-48632A	*48K A & T*	**$384.95**
MEM-64633A	*64K A & T*	**$399.95**

MEMORY BANK - Jade

4 MHz S-100 bank selectable expandable to 64K.

MEM-99730B	*Bare board w/manual*	**$49.95**
MEM-99730K	*Kit with no RAM*	**$179.95**
MEM-32731K	*32K kit*	**$199.95**
MEM-64733K	*64K kit*	**$249.95**
Assembled & Tested		**add $50.00**

32K RAM 20 - CompuPro

32K static RAM, up to 10 MHz, disable-able in 4K banks, bank select or 24 bit addressing.

MEM-16180A	*16K A & T*	**$259.95**
MEM-16180C	*16K CSC*	**$324.95**
MEM-24180A	*24K A & T*	**$324.95**
MEM-24180C	*24K CSC*	**$384.95**
MEM-32185A	*32K A & T*	**$384.95**
MEM-32185C	*32K CSC*	**$449.95**

16K STATIC RAM - Mem Merchant

4MHz lo-power static RAM board, IEEE S-100, bank selectable, addressable in 4K blocks, disable-able in 1K segments extended addressing.

MEM-16171A	*16K A & T*	**$149.95**

S-100 I/O Boards

SYSTEM SUPPORT 1 - CompuPro

Real time clock, three 16 bit interval timers, dual interrupt controllers(15 levels), up to 4K EPROM/RAM, RS-232C serial channel, provision for 9511A/9512 math chip.

IOX-1850A	*SS1 A & T*	**$359.95**
IOX-1850C	*SS1 CSC*	**$459.95**
IOX-1855A	*with 9511 A & T*	**$554.95**
IOX-1855C	*with 9511 CSC*	**$654.95**
IOX-1860A	*with 9512 A & T*	**$554.95**
IOX-1860C	*with 9512 CSC*	**$654.95**

INTERFACER 1 - CompuPro

2 serial I/O ports 50-19.2K baud.

IOI-1810A	*A & T*	**$218.95**
IOI-1810C	*CSC*	**$288.95**

INTERFACER 2 - CompuPro

3 parallel, 1 serial, & interrupt timer.

IOI-1820A	*A & T*	**$218.95**
IOI-1820C	*CSC*	**$288.95**

INTERFACER 3 - CompuPro

5 or 8 channel serial I/O board for interrupt driven multi-user systems up to 250K baud.

IOI-1835A	*5 port A & T*	**$558.95**
IOI-1835C	*5 port CSC*	**$628.95**
IOI-1838A	*8 port A & T*	**$628.95**
IOI-1838C	*8 port CSC*	**$749.95**

INTERFACER 4 - CompuPro

3 serial, 1 parallel, 1 Centronics parallel.

IOI-1840A	*A & T*	**$314.95**
IOI-1840C	*CSC*	**$414.95**

MPX - CompuPro

Multi-user I/O multiplexer & interrupt controller with on-board 8085A-2 CPU & 4K or 16K of RAM.

IOI-1875A	*4K MPX A & T*	**$444.95**
IOI-1875C	*4K MPX CSC*	**$534.95**
IOI-1880A	*16K MPX A & T*	**$584.95**
IOI-1880C	*16K MPX CSC*	**$674.95**

I/O-8 - SSM Microcomputer

Eight software programmable serial I/O ports, 110 -19.2K Baud, ideal for multi-user systems

IOI-1018A	*A & T*	**$469.95**

I/O-5 - SSM Microcomputer

Two serial & 3 parallel I/O ports, 110-19.2K Baud

IOI-1015A	*A & T*	**$289.95**

MPC-4 - SD Systems

Intelligent 4-port serial I/O card, on-board Z-80A, 2K RAM, 4K PROM area, on-board firmware, fully buffered, vectored interrupts, four CTC channels, add to SD Board set for powerful multi-user system

IOI-1504A	*A & T w/software*	**$495.00**

I/O-4 - SSM Microcomputer

2 serial I/O ports plus 2 parallel I/O ports.

IOI-1010B	*Bare board w/manual*	**$35.00**
IOI-1010K	*Kit with manual*	**$179.95**
IOI-1010A	*A & T with manual*	**$249.95**

2830 6 PORT SERIAL - C.C.S.

Six asynchronous RS-232C serial I/O ports with programmable baud rates.

IOI-1040A	*A & T with manual*	**$529.95**

2710 4 PORT SERIAL - C.C.S.

Four RS-232C serial I/O ports with full handshaking.

IOI-1060A	*A & T with manual*	**$319.95**

2719 2 SER & 2 PAR - C.C.S.

Two RS-232C serial I/O ports plus two 8 bit parallel I/O ports.

IOI-1080A	*A & T with manual*	**$349.95**

Prices may be slightly higher at our retail locations. Please call the store nearest you for local price and availability.

is this person's great-great-great grandfather and where was he born?" may need answering. Actually, that question is ambiguous because each person has 16 ancestors who qualify as "great-great-great grandfather." The same question could be phrased as "one's father's father's father's father's father." Using that notation, each of the 16 ancestors can be uniquely identified. For example, "mother's father's father's father's father's father'," or "father's father's mother's mother's father."

Questions such as these are easily answered by using a tree-structured genealogical database such as a pedigree chart.

Figures 6(a) and 8(a) show what one family tree might look like. Three functions are needed to use the database. "Add" adds a new ancestor to the tree. "Print" displays the information on one or several ancestors. "Change" modifies the information in the database. For example, you may discover that a name is misspelled or the date of birth is incorrect. A delete function is not needed; deleting your ancestors would have fatal consequences for all subsequent offspring.

A tree is a logical representation for the data.

Listing 1 shows the system in operation. A special notation references the ancestor by his or her relation to the person at the root of the tree. If the family tree has your ancestry, then your grandmother, or your mother's mother, is denoted by MM. Similarly, your mother's father is specified by MF.

When searching back several generations, typing long sequences of M and F is tedious. Instead, a short hand notation must be provided. For example, F5 can be equivalent to FFFFF. A trailing digit indicates a repeat factor for the previous character. Some more examples:

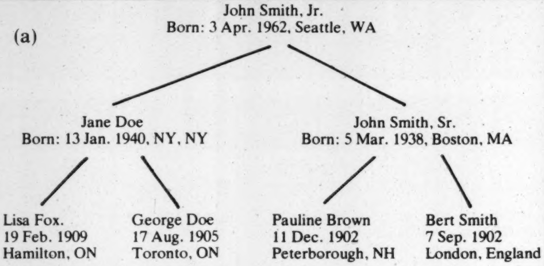
F = your father
M = your mother
FF = your grandfather
FO or MO = your self (0th father or mother)
F3M5F = FFFMMMMMF

When the program is run the first time, the database is empty. The only name that can be added is your own (see Listing 1). To add other names, you must specify the relationship to yourself. The next name after yourself may be either your father or mother, identified by either F or M.

When printing information from the tree, the program prompts for the relationship of the person whose data record you would like to see. For example, entering F2 refers to your grandfather. You can also see all of the ancestors for that particular person. Or you may wish to print the names of your grandfather's father and mother.

The number of generations to display is indicated by appending a plus sign. For example, FF1 tells the program to display your grandfather's record plus one additional generation. FF2 displays two generations beyond your grandfather. If no digit follows the plus (FF) all generations previous to the one specified are shown. Several examples of the program in operation are presented in Listing 1.

A tree is a logical representation for the data. The database is made from a series of records kept in a data file on disk. Each record contains a name, birth date and place, death date and place, and pointers to the corresponding father and mother records. The first record in the database always corresponds to the youngest person. All other records are linked in by their father and mother pointers. The source listing for the program appears next month in Part 3, written in MicroSoft Basic 5.21.



(b)

Record number				
1 John Smith, Jr.	3 Apr. 1962, Seattle, WA	# 3	# 2
2 John Smith, Sr.	5 Mar. 1938, Boston, MA	# 6	# 7
3 Jane Doe	13 Jan. 1940, NY, NY	# 5	# 4
4 George Doe	17 Aug. 1905, Toronto, ON		
5 Lisa Fox	19 Feb. 1909, Hamilton, ON		
6 Pauline Brown	11 Dec. 1902, Peterborough, NH		
7 Bert Smith	7 Sep. 1902, London, England		

Figure 8. At (a) is a small family tree showing birth date and place for each of the family members. At (b) is the same information but translated into data records for keeping on a disk file. The numbers at the right of records 1 through 4 point to the corresponding mother and father records.

Figure 8(a) shows a small family tree. When programmed in Basic, all of the data at each node are placed in a single record. Each record contains pointers to the ancestor records. The family tree in 8(a) appears as a data file in 8(b). Part 3 provides additional information on representing tree structures in Basic.

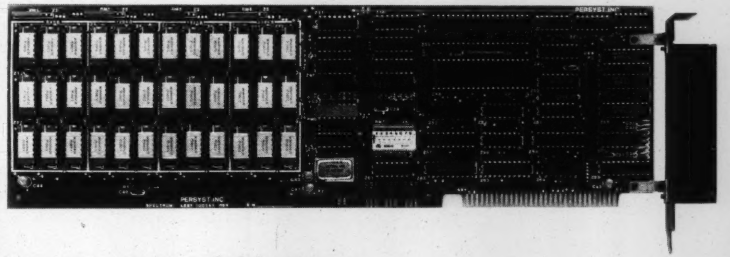
Listing 1.

```
Geneological Pedigree Chart Maker

Enter:  A(dd  P(rint  C(hange  Q(uit ? A

Enter your name -

Enter name ? JOHN SMITH, JR
Enter birth date ? 3 APR 1962
Enter Place of Birth ? SEATTLE, WASH
Enter Death Date ?
Enter Place of Death ?

Specify relationship (CR=Exit) ? M
Enter name ? JANE DOE
Enter birth date ? 13 JAN 1940
Enter Place of Birth ? NY
Enter Death Date ?
Enter Place of Death ?

Specify relationship (CR=Exit) ? F
Enter name ? JOHN SMITH, SR
Enter birth date ? 5 MAR 1938
Enter Place of Birth ? BOSTON
Enter Death Date ?
Enter Place of Death ?

Specify relationship (CR=Exit) ?

Enter:  A(dd  P(rint  C(hange  Q(uit ? P

Print Pedigree Chart
```

PERSYST

FOR THE IBM® PERSONAL COMPUTER

IBM



SPECTRUM Multifunction Board

FOUR FUNCTIONS INDEPENDENTLY UPGRADEABLE

Memory Expandable RAM

- Expandable from 64 to 256K Bytes
- Parity generate and check
- Base address switch-selectable for any 64K boundary
- No wait states

Expandable Parallel Printer Port

- Supports Centronix, Data Products or IDS interface
- Switch selection of printer port I/O address
- Selectable Interrupt level
- Adjustable flat cable clamp (strain relief)

Two Expandable Asynchronous Communication Ports

- Single or Dual Channel, RS 232-C
- DCE/DTE selectable
- 3 wire interface support
- Full modem support
- Programmable Baud rates from 50 to 19,200
- Selectable Interrupt levels
- Programmable character length, stop bits and parity
- Single line configuration addressable as COMM 1 or COMM 2

PERSONAL SYSTEMS TECHNOLOGY, INC.

22957 LA CADENA LAGUNA HILLS, CA. 92653 (714) 859-8871

©Copyright Personal Systems Technology Inc. 1982 IBM is a trademark of International Business Machines Corp.

CIRCLE 240 ON READER SERVICE CARD

An Intro to Data Structure, continued...

Listing 1, continued...

```
Enter relationship (+ for all, CR=Exit) ? +
     JOHN SMITH, SR
JOHN SMITH, JR
     JANE DOE


Enter relationship (+ for all, CR=Exit) ? F

JOHN SMITH, SR
Born:  5 Mar 1938   Place:
Died:               Place:

Enter relationship (+ for all, CR=Exit) ?

Enter:  A(dd  P(rint  C(hange  Q(uit ? A

Add New Ancestor

Specify relationship (CR=Exit) ? FM
Enter name ? PAULINE BROWN
Enter birth date ? 11 DEC 1902
Enter Place of Birth ? PETERBOROUGH, NH



Enter Death Date ?
Enter Place of Death ?

Specify relationship (CR=Exit) ?

Enter:  A(dd  P(rint  C(hange  Q(uit ? P

Print Pedigree Chart

Enter relationship (+ for all, CR=Exit) ? +
     JOHN SMITH, SR
          PAULINE BROWN
JOHN SMITH, JR
     JANE DOE

Enter relationship (+ for all, CR=Exit) ?

Enter:  A(dd  P(rint  C(hange  Q(uit ? Q
Ok
```

Summary

By viewing the memory of a computer as an organized collection of data, rather than mere bits and bytes, simple and complex data structures are created. Many problems can not be solved unless the proper representation for the data is used.

Lists are structures that grow and contract dynamically, and provide for rapid insertion, deletion, and rearranging of the list elements. The self-organizing list is only one example of how a list might be used. In fact, the entire programming language Lisp is based on the use of list structures.

Stacks are necessary for subroutine calls and provide a direct method of evaluating RPN expressions or converting algebraic notation into RPN notation. Several computer systems have been built based on *stack architectures*. Among these are the Burroughs B5500 and the UCSD P-Machine, simulated on the UCSD Pascal System. In addition, the computer language Forth uses a stack and an RPN-like notation for all of its operations.

Binary trees and other tree structures are especially important in database systems and file systems. They are often used to show relationships among members of a group (a family tree) and to organize data alphabetically or in some other collating sequence. The binary search algorithms have the interesting side effect of sorting their input into alphabetical order, and are sometimes used for the "Insertion Sorts," which will be described in Part 4.

Part 3 shows how these structures can be programmed in the Basic language and includes the source listing for the genealogical relationships program. Part 4 describes several sorting techniques, including Shellsort and Quicksort. Quicksort is an especially fast sort algorithm, well suited to sorting large tables of randomly distributed data. ☐

References

Aho, Alfred V. and Jeffrey D. Ullman, *Principles of Compiler Design*, Addison-Wesley Publishing Co., Reading, MA, 1977.

Gotlieb, C. C. and L. R. Gotlieb, *Data Types and Structures*, Prentice-Hall, Inc., Englewood Cliffs, NJ, 1978.

Grappel, Robert, "The My Dear Aunt Sally Algorithm," *Byte*, Vol. 2, No. 2, p. 19.

Knuth, Donald E., "Algorithms," *Scientific American*, April 1977, Vol. 236, No. 4, p. 63.

Knuth, Donald E., *The Art of Computer Programming: Fundamental Algorithms*, Vol. 3, Addison-Wesley Publishing Co., Reading, MA, 1973.

Maurer, W. Douglas, "Processing Algebraic Expressions," *Byte*, Vol. 2, No. 2, p. 25.

Standish, Thomas A., *Data Structure Techniques*, Addison-Wesley Publishing Co., Reading, MA, 1973.

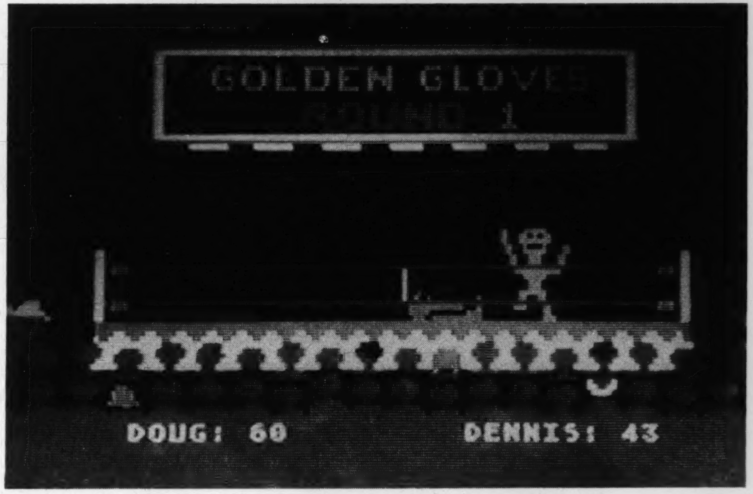
Swanson, Paul, "PDQ: A Data Manager for Beginners, Don't Reinvent the Wheel," *Byte*, Vol. 6, No. 11, Nov. 1981, p. 236

Gorney, Len, "Queuing Theory, the Science of Wait Control, Part 1: Queue Representation," *Byte*, Vol. 4, April 1979, p. 132.

Gorney, Len, "Queuing Theory, the Science of Wait Control, Part 2: System Types," *Byte*, Vol. 4, No. 5, May 1979, p. 176.

XYZ
DUMB
TERMINAL
SMelton

ARTWORX SCORES ANOTHER TECHNICAL KNOCKOUT.



Scene from GOLDEN GLOVES

HODGE PODGE: by Marsha Meredith (Atari and Apple)
NOW AVAILABLE FOR ATARI!!! This captivating program is a marvelous learning device for children from 18 months to 6 years. HODGE PODGE consists of many cartoons, animation and songs which appear when any key on the computer is depressed. A must for any family containing young children.
PRICE. **$19.95** diskette

☐ **PM EDITOR:** by Dennis Zander (Atari, 16K)
Create your own fast action graphics game for the Atari 400 or 800 using its player missile graphics features. By using player data stored as strings, players can be moved or changed (for animation) at machine language speed. All this is done with string variables (PO$(Y)=SHIP4). This program is designed to permit creation of up to 4 players on the screen, store them as string data and then immediately try them out in the demo game included in the program. Instructions for use in your own game are included. PM EDITOR was used to create the animated characters in **ARTWORX** RINGS OF THE EMPIRE and ENCOUNTER AT QUESTAR IV.
PRICE . . . . **$29.95** cassette **$33.95** diskette

☐ **ROCKET RAIDERS** by Richard Petersen (Atari 24K)
Defend your asteroid base against pulsar bombs, rockets, lasers, and the dreaded "stealth saucer" as aliens attempt to penetrate your protective force field. Precise target sighting allows you to fire at the enemy using magnetic impulse missiles to help protect your colony and its vital structures.
PRICE . . . . **$19.95** cassette **$23.95** diskette

☐ **FOREST FIRE TWO:** by Richard Petersen (Atari 24K)
FOREST FIRE has been enhanced and now offers a two player mode for head to head competition to see who can survive, suffer the least damage and put their fire out first. User input now determines landscape, wind and weather conditions, offering limitless game variation. FOREST FIRE's excellent color graphics have been made even better, turning your computer into a super-detailed fire scanner.
PRICE . . . .**$16.95** cassette **$20.95** diskette

☐ **FORM LETTER SYSTEM:** (Atari, North Star and Apple)
This is the ideal program for creating personalized form letters! FLS employs a simple-to-use text editor for producing fully justified letters. Addresses are stored in a separate file and are automatically inserted into your form letter along with a personalized salutation. Both letter files and address files are compatible with **ARTWORX** MAIL LIST 3.0 and TEXT EDITOR programs.
PRICE . . . . **$39.95** diskette

☐ **THE PREDICTOR** by Thomas Barker
(Apple, Atari, TRS-80, North Star and CP/M (M-BASIC).
This is a complete package that covers least squares fitting of parameters for two or more variables. THE PREDICTOR can be used for predicting sales and process behavior, trend analysis, model building and many other uses calling for multilinear regression techniques. Each option in the program is prompted with simple YES/NO commands making it **very** easy to use.
PRICE . . . . **$29.95** diskette

☐ **PILOT:** by Michael Piro (Atari, 16K)
Pilot your small airplane to a successful landing using both joysticks to control throttle and attack angle. PILOT produces a true perspective rendition of the runway, which is constantly changing. Select from two levels of pilot proficiency.
PRICE . . . . **$16.95** cassette **$20.95** diskette

☐ **TEXT EDITOR:** (Atari and North Star)
This program is very "user friendly" yet employs all essential features needed for serious text editing with minimal memory requirements. Features include common sense operation, two different justification techniques, automatic line centering and straightforward text merging and manipulation. TEXT EDITOR files are compatible with **ARTWORX** FORM LETTER SYSTEM.
PRICE . . . . **$39.95** diskette

☐ **MAIL LIST 3.0:** (Atari, Apple and North Star)
The very popular MAIL LIST 2.2 has now been upgraded. Version 3.0 offers enhanced editing capabilities to complement the many other features which have made this program so popular. MAIL LIST is unique in its ability to store a maximum number of addresses on one diskette (typically between 1200 and 2500 names!). Entries can be retrieved by name, keyword(s) or by zip codes. They can be written to a printer or to another file for complete file management. The program produces 1, 2 or 3-up address labels and will sort by zip code (5 or 9 digits) or alphabetically (by last name). Files are easily merged and MAIL LIST will even find and delete duplicate entries! The address files created with MAIL LIST are completely compatible with **ARTWORX** FORM LETTER SYSTEM.
PRICE . . . . **$49.95** diskette

☐ **THE VAULTS OF ZURICH:** by Felix and Greg Herlihy (Atari, 24K, PET)
Zurich is the banking capital of the world. The rich and powerful deposit their wealth in its famed impregnable vaults. But you, as a master thief, have dared to undertake the boldest heist of the century. You will journey down a maze of corridors and vaults, eluding the most sophisticated security system in the world. Your goal is to reach the Chairman's Chamber to steal the most treasured possession of all: THE OPEC OIL DEEDS!
PRICE . . . . **$21.95** cassette **$25.95** diskette

☐ **BRIDGE 2.0** by Arthur Walsh (Atari (24K), Apple TRS-80, PET, North Star and CP/M (MBASIC) systems)
Rated #1 by Creative Computing, BRIDGE 2.0 is the only program that allows you to both bid for the contract and play out the hand (on defense or offense!). Interesting hands may be replayed using the "duplicate" bridge feature. This is certainly an ideal way to finally learn to play bridge or to get into a game when no other (human) players are available.
PRICE . . . . **$17.95** cassette **$21.95** diskette

☐ **ENCOUNTER AT QUESTAR IV:** by Douglas McFarland (Atari, 24K)
As helmsman of Rikar starship, you must defend Questar Sector IV from the dreaded Zentarians. Using your plasma beam, hyperspace engines and wits to avoid Zentarian mines and death phasers, you struggle to stay alive. This BASIC/Assembly level program has super sound, full player missile graphics and real time action.
PRICE . . . . **$21.95** cassette **$25.95** diskette

NEW PROGRAMS!

GOLDEN GLOVES: by Douglas Evans (Atari 24K)
Use your joystick to jab, block and duck as each player attempts to land the knockout punch. This unique real-time program brings all of the excitement of ringside to your Atari. GOLDEN GLOVES is a one or two-player game, or you can be a spectator as the computer controls both fighters.
PRICE . . . .**$22.95** cassette **$26.95** diskette

CRAZITACK: by Peter Adams (Atari 16K)
The Crazies are attacking us and the only defenses are three MX bases. Missiles can be launched singly or in a salvo, but it is doomsday when you run out of missiles.
PRICE . . . .**$17.95** cassette **$21.95** diskette

DOMINATION: by Alan Newman (Atari 24K)
Between one and six players compete for power via economic, diplomatic and military means in this award-winning game. You must make decisions quickly, exercise skillful hand-eye coordination, outguess your opponents and cope with random events.
PRICE . . . .**$17.95** cassette **$21.95** diskette

POKER TOURNEY: by Edward Grau (Atari 32K, Northstar)
You are entered in a high stakes Draw Poker Tournament facing six opponents including Lakewood Louie, Shifty Pete and Dapper Dan. Each has his own style of play and of bluffing. POKER TOURNEY utilizes the Joker, has true table stakes play and each hand is played based on pot odds. The Atari version's graphics and sound are superb of course (programmed by Jerry White) making POKER TOURNEY the class program of its type.
PRICE . . . .**$18.95** cassette **$22.95** diskette

HAZARD RUN: by Dennis Zander (Atari, 16K)
The sheriff has spotted you and you must make the treacherous run through Crooked Canyon past Bryan's Pond to the jump at Hazard Creek and safety. You can even put the joystick-controlled GEE LEE car up on two wheels to make it through some tight spots. A lead foot is not always the answer as you dodge trees, rocks and chickens in this nerve-racking game. HAZARD RUN employs full use of player/missile graphics, re-defined characters and fine scrolling techniques to provide loads of fast action and visual excitement.
PRICE. . . . .**$27.95** cassette **$31.95** diskette

ORDERING INFORMATION

Call ARTWORX toll-free number to order direct:
800-828-6573
In New York, Alaska, Hawaii call:
(716) 425-2833

All orders are processed and shipped within 48 hours.

Shipping and handling charges:
Within North America: Add $2.00
Outside North America: Add 10% (Air Mail)
New York State residents add 7% sales tax

Quantity Discounts:
Deduct 10% when ordering 3 or more programs

Ask for ARTWORX at your local computer store.

Write for FREE Catalogue listing more information about these and other quality ARTWORX programs.

Artworx
150 North Main Street Fairport, NY 14450

Pilot-to-Basic Translator

M.R. Smith

In the development of courseware, the instructor really only needs to do three things: type a message to a student, receive the student's answer to check whether it is right, and jump to different parts of the lesson depending on whether the student's response was what was expected.

More complicated things are needed only about 5% of the time. Authoring languages, of which Pilot is an example, are designed to allow the instructor to develop courseware without bothering with the "computational details."

This article is divided into three parts. Part 1 details the Pilot commands and provides examples. Part 2 gives a description of how each Pilot command is turned into the equivalent Basic commands. Modifications can be made to adjust the Pilot commands to the needs of each courseware writer if that is desired. Suggested improvements and extensions are given. Part 3 describes how to choose a suitable text editor.

The program described here is designed to take care of those computational details. It takes a series of Pilot commands and turns them into a valid Basic program. Although the Basic programs that it writes are not tremendous, they perform the function of allowing the courseware to be effectively and simply made. If the writer of the courseware wants to take the Basic programs generated by this translator and do a little pruning, then he is welcome to do so and is able to do so very easily.

For this program to operate, it is necessary for the Pilot lesson to be on a disk TEXT file PILOT.LESSON NAME. This program takes each Pilot command and generates the equivalent series of Basic statements stored in a program called LESSON NAME where LESSON NAME is any lesson name.

When you are typing in this program be very careful of the syntax. The mixture of valid Basic statements inside apparently invalid PRINT statements can lead to reading and typing errors.

Pilot Commands

This section is rather terse. It is intended to show the simple richness of the Pilot language rather than give great detail on how to use the language. The tutorials that follow will perform that function.

T: Type a line.

TC: Clear the page before typing.

TV: Vertical tab down a page. TV:5 would start at the fifth line.

TI: Type this line in inverse characters.

TH: Type this line and don't add a carriage return.

A: Accept a student answer.

M: Match the student's last response. M: A,B would compare student answer with A and B as letters or match against some known value. M:$N1$ would compare the student's last answer against what is stored in $N1$.

Y and N modifiers are used to perform an instruction depending on whether the last month instruction (M:) was true or not. For example, TN: Type this line if the last match was not true or MY: SECOND-ITEM try a second match if the last one was true.

* is used to start a lesson part.

E is used to finish the lesson. For example:

*:lesson 1
T:line 1 lesson 1
*:lesson 2
T:line 1 lesson 2
E:end of the lessons

U:is used to jump to a USER routine. The USER routine should start after the end of the main lesson. On completing the user routine, the program returns to the lesson part from which it came. Each user routine must end with the E: command so that it can be identified. For example:

*:main lesson
T:line 1
U:USER
T:line 1 of next bit of main lesson
U:USER
T:etc
.....
E:End of main lesson
*:USER
TH:Press return to continue
A:
E:

J: or jump command can be used to move different parts of a lesson. You may jump to a lesson part or to a label. The labels are local, meaning that they are valid only between two

---

M.R. Smith, 304, 86th Ave., SE, Calgary, Alberta, Canada T2H 1N7.

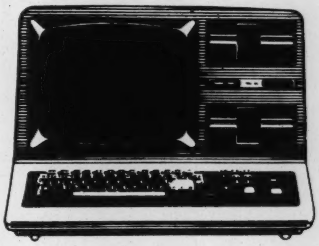
C & S Electronics Mart Ltd.

Dealer R-491

32 E. Main Street, Milan, Michigan 48160
Telephone (313) 439-1400 — 439-1508

CIRCLE 125 ON READER SERVICE CARD

26-1061 Model III 4K Lev. I	$ 650.00
26-1062 Model III 16K Lev. II	820.00
26-1065 Model III 48K 1 disk	1750.00
26-1066 Mod. III 48K 2 disk/RS-232	2250.00
26-4002 64K Model II 1 disk	3400.00
26-3001 Color Comp. 4K Lev. 1	350.00
26-3002 Color Comp. 16K Lev. II ext.	495.00
26-3003 Color Comp. 32K Lev. II ext.	645.00
26-3022 O-Drive for C.C.	540.00
26-3023 1-3 Drives for C.C.	360.00
26-5000 Videotex 4K	360.00
26-5001 Videotex 16K	450.00
26-3501 Pocket Comp.	145.00
26-3503 Interface	26.00
26-3505 Printer/Interface	115.00



Medical, Legal & other softwares available.

Colter	
48 K 2 disk drive 40 track	$1800.00
48 K 2 disk/RS-232	1875.00
48 K 2 disk/80 track	1950.00
48 K 2 disk/80 track/RS-232	2025.00

Printers	
Comet Printer	350.00
Starwriter Tractor	1695.00
Line Printer V	1595.00
C Itoh 8510	700.00
Line Printer VI	1050.00
Line Printer VII	360.00
Line Printer VIII	720.00
Daisy Wheel II	1800.00
Quick Printer	275.00
Quick Printer II	170.00
Plotter	1320.00

Prices can change without notification. All prices are cash prices; there will be a 4% handling charge for credit card use.

CIRCLE 125 ON READER SERVICE CARD

AFRAID OF HIGH SOFTWARE PRICES?

6 to 8 programs on CASSETTE every MONTH for (shudder) about 75 cents per program!

TRS-80
MODEL I & III

TRS-80
COLOR COMPUTER

Writing your own programs can be a scary proposition. And typing in a program from a hardcopy listing is a real nightmare! Bring on the dawn with a subscription to CLOAD or CHROMASETTE Magazine.

CLOAD and CHROMASETTE Magazines are monthly cassettes containing 6 to 8 ready-to-load programs apiece. Programs that take advantage of features unique to each computer (CLOAD for the Model I and III, CHROMASETTE for the Color Computer). Programs that even extend the capabilities of your computer beyond its manual's dark type! Quality game, tutorial, practical, and utility programs that reach your home by First Class Mail each month.

Don't be afraid. Get a subscription to CLOAD or CHROMASETTE Magazine. Or just enjoy a little taste and sink your fangs into a back issue. It von't take a bite out of your vallet.

CLOAD MAGAZINE INC.

The Bottom Line:

	1 year (12 issues)	$50.00
	6 months (6 issues)	$30.00
Single copies	Back issues	$ 6.00
	Good Games #1	$12.00
	Adventures #1	$13.00

California residents add 6% to single copies. North America — First Class Postage Included. Overseas — add $10 to subscriptions, and $1 to single copies. Sent AO rate.

The Fine Print
All issues from Oct '78 on available — ask for list (24 Level I issues also). Programs are for 16K Level II, 16K Model III, and occasionally for disks. **TRS-80** is a trademark of Tandy Corp.

P.O. Box 1448
Santa Barbara, CA 93102 (805) 962-6271

MasterCard/Visa

Chromasette Magazine

The Bottom Line:

1 year (12 issues)	$45.00
6 months (6 issues)	$25.00
Single copies	$ 5.00

Calif. residents add 6% to single copies.
North America — First Class Postage Included.
Overseas — add $10 to subscriptions, and $1 to single copies.
Sent AO rate.

P.O. Box 1087,
Santa Barbara, CA 93102
(805) 963-1066

The Fine Print: Issues are sent First Class Mail. All issues from July 1981 on available — ask for list. Programs are for the Extended BASIC model and occasionally for disks.

CIRCLE 130 ON READER SERVICE CARD

CIRCLE 131 ON READER SERVICE CARD

lesson part names. The labels can be from 1 to 9. The command J:10 jumps to the next E: command. For example:

* START
T:What lesson? Vowels or Numbers?
A:
M:V
JY: VOWELS
JN:1
1*:NUMBERS lesson
....
....
J:START
*:VOWELS
....
J:1
1R: Previous statement jumps here. This label 1 can be used by any JUMP command after the lesson part VOWELS
....
J:START

L: is a link instruction which causes the running of another Basic program.

B: is any valid Basic instruction. (B: SPEED=120)

X: Checks whether this statement is true (Boolean algebra). Acts as a match instruction with more power. Sets the Y and N modifiers. (X: T < 3).

R: is a remark statement. It is used to place a remark or comment statement in the program (R:This is a remark).

G: is a graphics command. The graphics screen is divided into a grid 100 units long by 100 units wide. The bottom left-hand corner is the starting point (0,0).

GC: Clears the graphics screen.
GL: Draws a line.
GO: Turns on the graphics mode.
GP: Plots a point.

Program Description

This part of the article is for those experts who know they can improve upon my code. For people just interested in using Pilot, the only advantage of reading it is to get some idea of the limitations of this version of Pilot.

Each Pilot instruction is converted into its Basic equivalent and stored as a TEXT file on the disk. In Applesoft it is possible to EXEC this file straight into memory. EXECing a file means using a TEXT file as a series of commands as though you were typing the commands directly on the keyboard.

The translator beeps twice when it finds an error. Since a text file is being written to the disk, it is not possible to get a beep by typing PRINT CHR$(7) as this would get into the file. Instead, a standard Apple machine language call (CALL -1059) is used.

The start of a program (*:command) establishes a REM statement and a jump from the current line number to line number +20. The ten lines after the REM statement are used for GOTOs to the line number of a label. For example the following sequence of statements would produce the following Basic

```
*:start          1000 GOTO 1020  : REM START

J:1              1020 GOTO 1001

J:5              1030 GOTO 1005

1T:              1040 PRINT

                 1001 GOTO 1040

E:               1050 STOP

                 1005 STOP: REM NO LABEL 5
```

The E: statement is used to tidy up and check for undefined labels. The next lesson start (*:) has the same effect. The very final E: statement of a program checks to see if any jumps to procedures have not been defined. For example

```
*:START          1000 GOTO 1020 : REM START

U:USER

T:TYPE           1030 PRINT

U:ANOTHER

E:               1050 STOP

*:USER           3000 GOTO 3020

T:               3020 PRINT

E:               3030 RETURN

                 1020 GOSUB 3000

                 1040 STOP : REM NO PROCEDURE U:
                  ANOTHER
```

All errors in syntax are turned into statements starting in a STOP. This has the advantage that the writer can go in and make a modification to that statement without having to recompile the whole Pilot program.

The modify commands Y and N generate rather poor code but it works. The match instruction sets a FLAG that is checked for a 1 or a 0.

```
  TY:PRINT         1000 IF FLAG THEN 1010

                   1010 PRINT

                   1001 GOTO 1020

  TN:PRINT         1020 IF NOT FLAG THEN 1030

                   1030 PRINT

                   1021 GOTO 1040
```

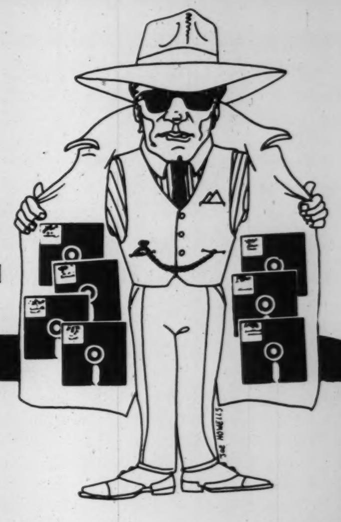
The accept instruction is implemented by a subroutine starting at line 70 of the generated Basic program. The student's answer is stored in a variable ANS$. The input routine is user-friendly. Backspaces and line delete (control-x) are supported.

```
  A:             1000 PRINT BELL$;: GOSUB 70

  A: $N1$        1010 PRINT BELL$;: GOSUB 70 :
                  NAME$ = ANS$
```

The match instruction is implemented by a subroutine starting at line 10 in the generated Basic program. The value to be checked is stored in a variable called CHECK$ and then compared to the answer stored in ANS$.

```
  M:A            1000 FLAG = 0
                 1010 CHECK$ = "A" : GOSUB 10 :
                  IF FLAG = 1 THEN 1020
  M:A,B,$N1$     1020 FLAG = 0

                 1030 CHECK$ = "A" : GOSUB 10 :
                  IF FLAG = 1 THEN 1060

                 1040 CHECK$ = "B" : GOSUB 10 :
                  IF FLAG = 1 THEN 1060
                 1050 CHECK$ = N1$ : GOSUB 10 :
                  IF FLAG = 1 THEN 1060
```

Psst! Wanna deal on some apple® Software...



GREAT SERVICE
GREAT PRICES
WHAT ELSE YOU
WANT?

micro
mountain

OVER 1,000 ITEMS IN STOCK — STOCK ITEMS SHIPPED SAME DAY — ASK FOR FREE CATALOG

HARDWARE SPECIALS

☐ Smarterm 80 Column board	345.00	Now	289.50
☐ Z-Card (Z-80, CP/M)	279.00	Now	239.50
☐ ALF 9-Voice Card w/Software	199.50	Now	179.50
☐ Low Res Color Monitor	449.00	Now	389.50
☐ RGB Color II Interface	199.00	Now	169.50
☐ Dana Cooling Fan	49.95	Now	42.50
☐ Elephant Diskettes (Box of 10)	39.95	Now	24.50
☐ Hand Controller (Paddles)	29.95	Now	28.50
☐ Numeric Keypad	149.50	Now	139.50
☐ Z-80 Softcard with CP/M	399.95	Now	299.50
☐ CPS Multifunction Card	239.95	Now	189.50
☐ Music System	395.00	Now	339.50
☐ Supertalker	199.00	Now	339.50
☐ NEC 12" Hi-Res Green Monitor	285.00	Now	189.50
☐ NEC 12" Low-Res Color Monitor	495.00	Now	399.50
☐ The Grappler (Specify printer)	149.95	Now	139.50
☐ Lower Case Adapter (New)	49.95	Now	39.50
☐ VERSAcard 4 in 1 card	199.00	Now	179.50
☐ 16k Ramcard	195.00	Now	119.50
☐ Paddle Addapple I/O Port	29.95	Now	25.50
☐ Game Paddles	39.95	Now	32.50
☐ Joystick	59.95	Now	49.50
☐ Expand-a-Port	59.95	Now	49.50
☐ Thunderclock Plus	139.00	Now	129.50
☐ X-10 Ultrasonic Interface	49.00	Now	47.50
☐ Dos Dater Demo Disk	29.95	Now	26.50
☐ Station II	129.95	Now	119.50
☐ Versawriter Graphics Tablet	299.95	Now	279.50
☐ Videoterm 80 Column Card	345.00	Now	279.50

UTILITY PROGRAM SPECIALS

☐ Apple Spice	29.95	Now	24.50
☐ Hi-Res Secrets	124.95	Now	99.50
☐ Dos Boss	24.00	Now	21.50
☐ Utility City	29.50	Now	25.50
☐ Alpha Plot	39.50	Now	34.50
☐ Tip Disk #1	20.00	Now	17.50
☐ The Slide Show	49.95	Now	45.50
☐ 3-D Graphics System	39.95	Now	34.50
☐ Enhanced Graphics Software	59.95	Now	52.50
☐ Roots/M (Geneology program)	159.00	Now	165.50
☐ Home Money Minder	34.95	Now	29.50
☐ Home Accountant	74.95	Now	64.50
☐ Logo Applications Software	179.95	Now	144.50
☐ TASC Compiler	175.00	Now	152.50
☐ Nibbles Away II	69.95	Now	63.50
☐ The Voice	39.95	Now	34.50
☐ Master Diagnostics	50.00	Now	45.50
☐ The Locksmith	99.95	Now	86.50
☐ Lisa Assem. Lang. Dev. Sys.	79.95	Now	69.50
☐ Expediter II	99.95	Now	87.50
☐ The Manipulator	34.95	Now	29.50
☐ Complete Graphics System	59.95	Now	52.50
☐ Graphics Magician	59.95	Now	52.50
☐ Special Effects	39.95	Now	33.50
☐ Super Disc Copy	30.00	Now	25.50
☐ Disk Recovery (The Scanner)	30.00	Now	25.50
☐ Dos Plus	25.00	Now	21.50
☐ Back It Up (Nibble Copier)	59.95	Now	52.50
☐ Original Quick Loader	24.95	Now	21.50
☐ E-Z Draw 3.3	49.95	Now	39.50
☐ Data Capture 4.0/80 (Videx)	89.95	Now	75.50
☐ ASCII Express	64.95	Now	61.50
☐ Z-Term (Req CP/M	99.95	Now	92.50
☐ Z-Term Professional (Req CP/M)	149.95	Now	125.50
☐ Speed Star	134.95	Now	119.50
☐ A2-3D Graphics Package	59.95	Now	52.50
☐ Program Line Editor	40.00	Now	32.50
☐ Higher Graphics II	35.50	Now	27.50
☐ Visiterm	100.00	Now	89.50

EDUCATIONAL PROGRAM SPECIALS

☐ Auto Atlas	47.50	Now	41.50
☐ Compu-Math Arithmetic	49.95	Now	39.50
☐ Compu-Math Fractions	39.95	Now	33.50
☐ Compu-Math Decimals	39.95	Now	33.50
☐ Algebra 1	39.95	Now	33.50
☐ Statistics 3.0	29.95	Now	25.50
☐ Spelling Bee w/Reading primer	39.95	Now	34.50
☐ Counting Bee	29.95	Now	24.50
☐ The Vocabulary Game	29.95	Now	25.50
☐ Apple Grade Book	34.50	Now	29.50
☐ Pythagoras and the Dragon	39.95	Now	35.50
☐ Isaac Newton, Fig Newton	49.95	Now	43.50
☐ Master Type	39.95	Now	34.50
☐ Englash SAT #1	30.00	Now	26.50
☐ U.S. Constitution Tutor	30.00	Now	26.50
☐ Typing Tutor II	24.95	Now	22.50
☐ Division Skills	44.95	Now	39.50
☐ Mixed Numbers	44.95	Now	39.50
☐ Vocabulary (Preifx, Suffix, Roots)	44.95	Now	39.50
☐ Punctuation (Commas)	44.95	Now	39.50
☐ Elementary Math Edu-Disk	39.95	Now	36.50
☐ Lisa Educational Sys.	119.95	Now	99.50
☐ Whole Brain Spelling	34.95	Now	29.50

BUSINESS PROGRAM SPECIALS

☐ DBase II (req CP/M 56k version)	795.00	Now	575.50
☐ CPA #1 General Ledger	250.00	Now	199.50
☐ CPA #2 Accounts Receivable	250.00	Now	199.50
☐ CPA #3 Accounts Payable	250.00	Now	199.50
☐ CPA #4 Payroll	250.00	Now	199.50
☐ CPA #5 Property Management	250.00	Now	199.50
☐ The Budget Planner	150.00	Now	125.50
☐ Tax Beater	129.95	Now	105.50
☐ Real Estate Analysis Program	129.95	Now	105.50
☐ Financial Partner	175.00	Now	152.50
☐ Apple Pie (All Versions)	129.95	Now	109.50
☐ Tax Preparer	150.00	Now	135.50
☐ Creative Financing	150.00	Now	135.50
☐ Easy Writer Professional	250.00	Now	199.50
☐ Datadex Data Base Manager	150.00	Now	129.50
☐ Datafactory 5.0	300.00	Now	249.50
☐ The Tax Manager	200.00	Now	179.50
☐ Word Star (Req CP/M)	375.00	Now	275.50
☐ Time Manager	150.00	Now	127.50
☐ Screenwriter II	129.95	Now	109.50
☐ The General Manager	99.95	Now	86.50
☐ Dictionary	99.95	Now	86.50
☐ Executive Secretary	250.00	Now	179.50
☐ Executive Speller	75.00	Now	69.50
☐ Magic Window Word Proc.	99.95	Now	84.50
☐ Magic Mailer	69.95	Now	57.50
☐ Magic Words	69.95	Now	57.50
☐ PFS: Personal Filing Sys.	125.00	Now	108.50
☐ PFS: Personal Report Sys.	95.00	Now	79.50
☐ IFO Database Manager	120.00	Now	105.50
☐ Inventory System 3.3	200.00	Now	174.50
☐ Professional Time Billing	395.00	Now	174.50
☐ Apartment Manager	395.00	Now	349.50
☐ SuperCalc (Req CP/M)	295.00	Now	249.50
☐ D-B Master	229.95	Now	189.50
☐ D-B Utility Pack	99.95	Now	89.50
☐ D-B Utility Pack #2 (May)	99.95	Now	89.50
☐ Visacalc 3.3	250.00	Now	209.50
☐ Visifile	250.00	Now	209.50

GAMES SPECIALS

☐ Eliminator	29.95	Now	25.50
☐ Temple of Apshai	39.95	Now	32.50
☐ Crush, Crumble and Chomp	29.95	Now	24.50
☐ Ricochet	19.95	Now	17.50
☐ Zero Gravity Pinball	29.95	Now	25.50
☐ Game Pack #1	24.00	Now	21.50
☐ Star Blazer	31.95	Now	26.50
☐ Labrinth	29.95	Now	25.50
☐ Dueling Digits	29.95	Now	25.50
☐ Bug Attack	29.95	Now	25.50
☐ Microwave	34.95	Now	28.50
☐ Apple Barrel II (20 Programs)	34.95	Now	29.50
☐ Snack Attack	29.95	Now	24.50
☐ County Fair	29.95	Now	25.50
☐ Swashbuckler	34.95	Now	28.50
☐ Casino	39.95	Now	34.50
☐ The Prisoner	29.95	Now	25.50
☐ Empire I: World Builders	29.95	Now	25.50
☐ Rendezvous (April)	39.95	Now	32.50
☐ Alien Ambush	24.95	Now	19.50
☐ Horizon V	34.95	Now	28.50
☐ Sargon II	34.95	Now	29.50
☐ Reversal (Othello)	34.95	Now	29.50
☐ Zork II	39.95	Now	32.50
☐ Olympic Decathlon	29.95	Now	25.50
☐ Robot Wars	39.95	Now	34.50
☐ A.B.M.	24.95	Now	22.50
☐ Three Mile Island	39.95	Now	34.50
☐ Castle Wolfenstein	29.95	Now	25.50
☐ Wizard and the Princess	32.95	Now	29.50
☐ Hi-Res Soccer	29.95	Now	25.50
☐ Threshold	39.95	Now	35.50
☐ Time Zone	99.95	Now	86.50
☐ Ultima II	54.95	Now	45.50
☐ Marauder	34.95	Now	28.50
☐ Microchess 2.0	24.95	Now	22.50
☐ Gammon Gambler	24.95	Now	22.50
☐ Falcons	29.95	Now	25.50
☐ Star Blaster	29.95	Now	25.50
☐ Congo	32.95	Now	28.50
☐ Fastgammon	24.95	Now	21.50
☐ Beer Run	34.95	Now	29.50
☐ Snake Byte	29.95	Now	25.50
☐ Twerps	34.50	Now	28.50
☐ Kabul Spy	34.95	Now	28.50
☐ Bandits	34.95	Now	28.50
☐ Draw Poker	29.95	Now	24.50
☐ Computer Baseball	39.95	Now	33.50
☐ Tigers in the Snow	39.95	Now	34.50
☐ Computer Air Combat	59.95	Now	49.50
☐ Napoleons Campaign	59.95	Now	49.50
☐ Road to Gettysburg	59.95	Now	49.50
☐ Pursuit of th Graft Spee	59.95	Now	49.50
☐ Flight Simulator	33.50	Now	29.50
☐ Odyssey	30.00	Now	24.50
☐ Adventure to Atlantis	40.00	Now	34.50
☐ Space Raiders	29.95	Now	25.50
☐ Star Dance	24.95	Now	21.50

FREE OFFER

—Your Choice—
Original
Adventure Game
or **Applesoft™**
Tutorial
on disc with
purchase of
Any 3 Programs

DEDUCT 3% if payment accompanies order. WE PAY SHIPPING on all software orders OVER $50 in Continental U.S. (Foreign & Air Extra). ADD $2.50 SHIPPING & HANDLING on orders under $50. CALIF. RESIDENTS ADD 6% SALES TAX. We accept MASTER CARD and VISA. C.O.D.'S ADD $5.00.

NAME ____________________

STREET ____________________

CITY ____________________ STATE & ZIP ____________

CARD # ____________________ EXP. DATE ____________

SIGNATURE ____________________

★ 518 E. ECHO CT., SAN BERNARDINO, CA 92404
Outside Calif. Call (800) 854-5649
Calif. Residents Call (714) 886-0761

Prices Subject to Change without Notice

CIRCLE 212 ON READER SERVICE CARD

Pilot-To-Basic, continued...

The Boolean check (X: instruction) is turned into a Basic statement that sets the FLAG

```
   X:T < 3
   1000 IF (T < 3) THEN FLAG = 1
```

The other commands are implemented in a straightforward manner.

Subroutine Location

20 Get a file name.

140 Load the statements needed to initialize the Basic program being generated.

170 Generate the Basic program.

200 Clear up any undefined labels or lesson part names.

430 Make and execute the EXEC file.

1000 Find out which Pilot command is to be evaluated.

1070 Check on labels and the presence of a colon.

1170 Check if need to use the Y and N modifiers.

1260 Turn the Pilot command into a Basic statement.

24040 Performs the conversion of the accept (A:) command.

21010 Performs the conversion of the Basic (B:) command. Any apostrophes become quotation marks. For example B:PRINT 'PRINT THIS LINE' becomes 1000 PRINT "PRINT THIS LINE". This is a useful function if trying to get a $ printed. The presence of a $ in a type (T:) statement is assumed to be the start of a variable name.

20160 Converts the end (E:) command and clears up any undefined labels.

40010 Converts the graphics (G:) command. If this is the first graphics call then a HGR (call high res graphics) is performed.

29010 Converts the jump (J:) command. If the lesson name has not yet been used (i.e. not defined) the name is stored in NEED$(NEED,0) and the line number at which it is required is stored in NEED$(NEED,1).

23010 Converts the link (L:) instruction.

25010 Converts the match (M:) instruction.

20510 Converts the remark (R:) instruction.

35010 Converts the sound (S:) instruction. If this is the first sound instruction in the program, then the machine language subroutine needed to generate the sounds is loaded into the Basic program being made.

26000 Converts the type (T:) instruction. I have found that on a 40-character screen, it makes easier reading if every line of text is separated by a blank line. This is achieved by

T: line one
T:
T: line two

You might find it more convenient to automatically supply a blank line after each Type instruction. To do this change line 26210 to

26210 PRINT ": PRINT "

27010 Converts the user (U:) instruction. If the procedure being called is not found, then its name is stored in NEED$ (NEED, 0) and the negative of the line number where it is needed is stored in NEED$(NEED,1). By storing the negative of the line number, it is possible for the routine at line 200 to decide whether it is clearing up a jump or a user instruction.

22010 Converts the Boolean (X:) instruction.

30010 Converts the lesson part (*:) instruction. This clears up any undefined labels if that has not already been done by a preceding E: instruction. Lesson part names are stored in NP$(J,0) and the line numbers at which they start in NP$(J,1).

50000 This performs the loading of the match and accept subroutines into the Basic program being generated.

60000 Performs the initialization and description of the variables used in the program.

Suggested Extensions to Pilot

A link and chain instruction would be useful to allow the passing of variables, such as a student's name or number of questions correct, between programs. However, the problem of initializing the new program must be solved. A routine must recognize whether a program has been chained or called straight into memory, and adjust the initialization accordingly.

The code here for multiple matches works but could be made more elegant.

At the moment the Y and N must come second in a command or they are not implemented. This means that the command TYI: is compiled correctly, but "type this line in inverse if last match was true," is treated the same as TI:.

Syntax checking for the correct number of dollar signs in the match and type commands could be made more fool proof. At the moment no effort is made to see if the variable name is a valid one. For example, $LONG$ would generate a RUN-time error because of the presence of the ON in the middle of LONG.

When a Pilot statement is found with syntax errors, e.g. missing labels, a REM statement is formed, preceded by a STOP. It might be convenient to put the REM statement in inverse print to enable it to be spotted more easily.

Choosing a Text Editor

The presence of the colon in the middle of each Pilot command creates problems. Check your editor to see if it will work. The Apple DOS-Toolkit recognizes the colon as a command and will not let you enter it into a file. Other editors will let you enter it into a file but the Pilot-to-Basic program may not read it in properly. It expects all lines in a file to be stored as "LINE," i.e. a line surrounded by quotes. This means the line can be read in by an INPUT statement, giving slightly faster disk access than a GET statement.

If you find that your editor will read and reload files satisfactorily but Pilot-to-Basic will not read them, make the following modifications.

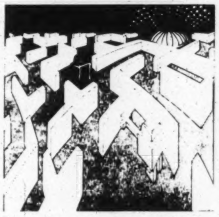
Replace line 1030 with:

```
1030 SENT$ = ""
1032 GET A1$ : IF A1$ = CHR$(13) THEN 1036
1034 SENT$ = SENT$ + A1$ : GOTO 1032
1036 IF PFLAG = 0 THEN PRINT D$;"WRITE "ENAME$
```

The text editor which I will describe in a forthcoming issue of *Creative Computing* does not need this modification. In addition, the text editor checks each statement as it is entered to check that it starts with a valid Pilot command. This removes many simple syntax errors at a time when they are easy to change. In addition, it converts all quotation marks to apostrophes, which removes another potential problem.

If you would like an Applesoft disk containing this program, a copy of the editor and a series of Pilot tutorial lessons, send a stamped addressed envelope, containing a 5" disk labelled with your name and address together with sufficient padding to protect the disk. Please enclose an additional $5 to cover my time and the wear and tear on my disk drives. To quote Chuck Carpenter, "If you don't send the stamped addressed envelope and the money, then I'll hang onto your disk until you do." If you live outside Canada, please enclose the money equivalent of the postage as the Post Office will not accept foreign postage. ($2.50 for a disk plus packing going First Class to the U.S.) ☐

INTRUDER!

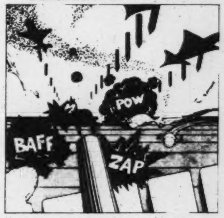


Four nuclear reactors have gone out of control, ready to melt down in only minutes. They are also protected by pre-programmed robots that can destroy anything in seconds. Your mission is to shut down the reactors and capture the robots before a melt down occurs. But before you enter ... remember you are the...

INTRUDER!

16K Cassette ...... 29.95 US funds
24K Disk .... 34.95 US funds

ALIEN SWARM



Space Invaders! Asteroids! Meteor Showers and more! You have defended them all. But can you survive the fetish attack of the...

ALIEN SWARM

100% Machine – Joysticks
16K Cassette ...... 29.95 US funds
16K Disk .... 34.95 US funds

INHOME SOFTWARE

CRYPTS OF TERROR

You are in search of the true meaning to life, but first you must battle each level in search of the magic ring. Will you survive this horror? What lurks in these deep and dark...

CRYPTS OF TERROR

Joystick – BASIC required.
16K Cassette ...... 29.95 US funds
16K Disk .... 34.95 US funds

MATH PACK + − ÷ ×

Atari brought the computer age home. Now we bring home the educational software.

MATH PACK was written for the educational side of the Atari by professional educators in the field of mathematics. All four independant math programs use Atari's sound and graphics to make learning more fun and enjoyable for your whole family. A final summary at the end of the programs lets you see how well you've done or what area needs to be practiced. Age and skill levels.

1) Math Pack Drill*
2) Equations* **
3) Jumble* **
4) Digit Span*

*BASIC and **Joysticks required.

16K – 2 tapes – 39.95 U.S. funds.
16K – Disk – 42.95 U.S. funds.

Check your local computer dealer or order direct from us.
Ordering: VISA, MasterCard, American Express and Cheques accepted.
Please include all numbers on cards.
Include phone number with all orders.
Add $2.00 for shipping and handling per item ordered.
Please specify which program ordering.
*DEALER INQUIRIES WELCOME

INHOME SOFTWARE
PH. 1-416-961-2760

1728 Avenue Rd.
Toronto, Ontario
Canada M5M3Y6

CIRCLE 179 ON READER SERVICE CARD

Computer Program Books for Beginners

Everything you need to know to get started programming your own computer. These handy books of programs, each jam-packed with easy-to-understand info for beginners, are crammed with hundreds of tips, tricks, secrets, hints, shortcuts, techniques, plus hundreds of ready-to-run programs.

APPLE Computer

101 APPLE Computer Programming Tips & Tricks, secrets, hints, shortcuts, techniques, for APPLE II. 128 pages **$8.95**

33 New APPLE Computer Programs for Home, School & Office, practical ready-to-run software for APPLE II. 96 pages **$8.95**

APPLE Computer BASIC Coding Form, handy preprinted program worksheets make writing software easy, fun. 40-sheet pad **$2.95**

Color Computer

101 Color Computer Prgramming Tips & Tricks, learn-by-doing instructions, hints, secrets, shortcuts, techniques, insights, for TRS-80 Color Computer. 128 pages **$7.95**

55 Color Computer Programs for Home, School & Office, practical ready-to-run software with colorful graphics for TRS-80 Color Computer. 128 pages **$9.95**

55 MORE Color Computer Programs for Home, School & Office, sourcebook of useful type-in-and-run software with exciting graphics, for TRS-80 Color Computer. 112 pages **$9.95**

The Color Computer Songbook, 40 favorite pop, classical, folk & seasonal songs arranged for TRS-80 Color Computer; ready-to-run music programs. 96 pages **$7.95**

Color Computer Graphics, complete guidebook loaded with tips, tricks, hints, secrets for making the most of TRS-80 Color Computer video graphics. Learn-by-doing instructions plus complete programs. 128 pages **$9.95**

My Buttons Are Blue and Other Love Poems from the Digital Heart of An Electronic Computer, for computer lovers **$4.95**

Color Computer Coding Form, handy preprinted programming worksheets make writing software easy, fun. 40-sheet pad **$2.95**

Pocket Computer

Pocket Computer Programming Made Easy, new fast 'n easy way to learn BASIC, make your computer work for you, for TRS-80, Sharp, Casio pocket computers. 128 pages **$8.95**

101 Pocket Computer Programming Tips & Tricks, secrets, hints, shortcuts, techniques from a master programmer. 128 pages **$7.95**

50 Programs in BASIC for Home, School & Office, sourcebook of tested ready-to-type-in-and-run software for TRS-80 and Sharp pocket computers. 96 pages **$9.95**

50 MORE Programs in BASIC for Home, School & Office, ideal source for lots more useful software for TRS-80 and Sharp pocket computers. 96 pages **$9.95**

Murder in The Mansion and Other Computer Adventures, with 24 game programs: murder mystery, space, adventure, loads of fun for TRS-80 and Sharp pocket computers. 96 pages **$6.95**

35 Practical Programs for the Casio Pocket Computer, book of useful type-in-and-run software for the FX-702P. 96 pages **$8.95**

Pocket-BASIC Coding Form, preprinted program worksheets make writing programs a breeze; for TRS-80, Sharp, Casio pocket computers, 40-sheet pad **$2.95**

Universal BASIC Coding Form, 40-sheet pad **$2.95**

IBM Personal Computer Form **$2.95**

Order direct from this ad. Send check, money order, or MasterCard or VISA account number and expiration date. Include $1 shipping for each item ordered up to a maximum of $3. Or write for our free catalog. Mail orders to:

ARCsoft Publishers

Post Office Box 132F
Woodsboro, MD 21798
(301) 663-4444

MasterCard VISA

Customers outside North America wanting airmail send $4 postage per book U S dollars

CIRCLE 114 ON READER SERVICE CARD

Dysan
CORPORATION

Solve your disc problems, buy 100% surface tested Dysan diskettes. All orders shipped from stock, within 24 hours. Call toll FREE (800) 235-4137 for prices and information. Visa and Master Card accepted.

PACIFIC
EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401. (In Cal. call
(805) 543-1037)

CIRCLE 233 ON READER SERVICE CARD

ATARI·EAST

800 – 16K RAM	$639
800 - 48K RAM	729
810 – DISK DRIVE	439
850 – INTERFACE	169
484 – COMMUNICATOR KIT	298
RFD – PERCOM: ATARI DISK DR.	669
EPSON MX – 80 FT G+	495

481	Entertainer	68
4022	Pac-Man	32
4020	Centipede	32
4011	Star Raiders	35
8126	Microsoft Basic	67
404	Word Processor	107
405	Pilot Educator	99
4018	Pilot	60
4007	Music Composer	32
K-Byte	Krazy Shoot Out	36
4003	Assembler Editor	45

Others at Similar Savings!!
25% Off 3rd party Atari Software

UHC
301-963-1425
P.O. Box 2120
Gaithersburg, MD
20879

$100 Minimum order
Shipping extra–

Prices subject to change. To order send 10% deposit (certified check or Money orders), Balance due COD.

CIRCLE 295 ON READER SERVICE CARD

$$$ $$$

D/Punch?

HOW WOULD YOU LIKE A 500% RETURN ON INVESTMENT IN 10 MINUTES? IN ACTUALITY, YOUR ROI INCREASES EACH TIME YOU USE D/PUNCH. D/PUNCH IS SPECIALLY ENGINEERED TO MAKE IT EASY FOR YOU TO PUNCH A CUTOUT ON YOUR FLOPPY DISKS--THEREBY ALLOWING YOU TO WRITE (SAVE) ONTO THE OTHER SIDE. WHEN YOU SEND US YOUR ORDER, BE SURE TO TELL US YOUR SYSTEM CONFIGURATION.

a) D/PUNCH	6.95
b) LABELS (100)	3.00
c) WRITE-PROTECT STICKERS (105)	2.65
d) DISK SAVER 5¼''	10.99
e) DISK SAVER RINGS (50)	5.25

ADD: $2.00 FOR SHIPPING & HANDLING;
MA RESIDENTS ADD 5% TAX
SEND CHECK OR MONEY ORDER TO:

D/Punch Co.
P.O. BOX 201
NEWTON HIGHLANDS, MA 02161
(617)964-2126

ALLOW 4-6 WEEKS FOR DELIVERY.

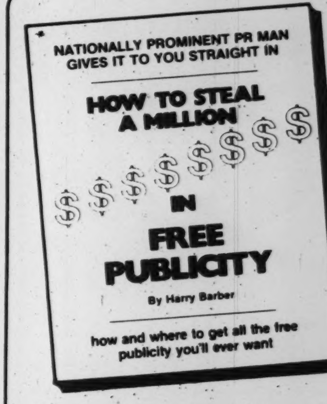
$$$ $$$

CIRCLE 158 ON READER SERVICE CARD

Pilot-To-Basic, continued...

```
1  REM  PILOT->BASIC CONVERTOR
2  REM
3  REM  M.R.SMITH, NOV 1981
4  REM
5  REM  304, 86TH AVENUE SE, CALGARY
6  REM  ALBERTA, CANADA T2H 1N7
7  REM
10  CLEAR : GOTO 60020
20  HOME : VTAB 10: PRINT "PILOT -> BASIC": PRINT : PRINT : PRINT
 "TRANSLATE WHAT FILE"BELL$
30  ONERR  GOTO 60
40  INPUT NAME$:NAME$ =  LEFT$ (NAME$ + "                ",14)
50  PRINT D$;"RUN PILOT."NAME$
60 X =  PEEK (222): POKE 216,0: IF X <  > 13 THEN  INVERSE : PRINT "
   PILOT."NAME$" DOES NOT EXIST"BELL$BELL$: PRINT : NORMAL : INPUT "
   PRESS RETURN TO CONTINUE";A$: GOTO 20
70 ENAME$ = "TEMP": GOSUB 62010: IF PFLAG = 1 THEN 110: REM
 PRINT TO SCREEN ON PFLAG
80  ONERR  GOTO 100: PRINT D$;"UNLOCK EXEC."ENAME$
90  PRINT D$;"DELETE EXEC."ENAME$
100  POKE 216,0
110 NAME$ = "PILOT." + NAME$:ENAME$ = "EXEC." + ENAME$
120  PRINT D$;"OPEN "NAME$
130  IF PFLAG = 0 THEN  PRINT D$;"OPEN "ENAME$
140  GOSUB 50020: REM  LOAD THE TITLE PAGE AND THE MATCH SUBROUTINE
150  PRINT D$;"NOMON C,I,O"
160  IF PFLAG = 0 THEN  PRINT D$;"MON C,I,O"
170  ONERR  GOTO 200
180  GOTO 1010: REM  GO AWAY TILL ERROR OCCURS
190  REM *****
200  POKE 216,0: IF PFLAG = 0 THEN  PRINT D$;"WRITE "ENAME$: REM
      CLOSE OUT
210  FOR K = 1 TO 9: REM   LOCAL LABELS
220  IF NL(K) = 1 THEN  PRINT CPROC + K"STOP: REM NO LABEL "K:BAD =
   BAD + 1: CALL  - 1059: CALL  - 1059
230  NEXT
240  IF NL(10) = 1 THEN  PRINT CPROC + 10" GOTO "LNUM: REM  DIRECT
  END JUMPS
250  PRINT LNUM" STOP"
260  IF NEED = 0 THEN 370
270  IF NP = 0 THEN 360: REM    NO PROCEDURES NAMED
280  FOR K = 1 TO NEED:SENT$ = NEED$(K,0)
290  FOR J = 1 TO NP
300  IF SENT$ = NP$(J,0) THEN  GOSUB 340: GOTO 320
310  NEXT J: PRINT  ABS ( VAL (NEED$(K,1)))" STOP: REM NO PROCEDURE
   CALLED "SENT$:BAD = BAD + 1: CALL  - 1059: CALL  - 1059
320  NEXT K
330  GOTO 370
340  PRINT  ABS ( VAL (NEED$(K,1)));: IF  VAL (NEED$(NEED,1)) < 0 THEN
   PRINT " GOSUB "NP$(J,1): RETURN
350  PRINT " GOTO "NP$(J,1): RETURN
360  FOR K = 1 TO NEED: PRINT  ABS ( VAL (NEED$(K,1)))" STOP:REM NO
   PROCEDURE CALLED "NEED$(K,0): NEXT :BAD = BAD + 1: CALL  - 1059: CALL
   - 1059
370 NNAME$ =  RIGHT$ (NAME$, LEN (NAME$) - 6)
380  IF PFLAG = 0 THEN 430
390  PRINT : PRINT : PRINT : PRINT NAME$
400  IF BAD <  > 0 THEN  PRINT " HAD "BAD" SYNTAX ERRORS"
410  IF BAD = 0 THEN  PRINT " HAD NO ERRORS"
420  STOP
430  PRINT "SAVE "NNAME$: PRINT "LOCK "NNAME$: PRINT "RUN"
440  PRINT D$;"CLOSE "ENAME$
450  IF BAD = 0 THEN 500
460  HOME : VTAB 10: PRINT NAME$" HAD "BAD" SYNTAX ERRORS ": PRINT :
   PRINT "USE THE FILE ANY WAY "BELL$: INPUT A$
470  IF A$ = "" THEN  PRINT BELL$BELL$: GOTO 470
480 A$ =  LEFT$ (A$,1): IF A$ = "N" THEN  STOP
490  IF A$ <  > "Y" THEN  GOTO 460
500  HOME : INVERSE : PRINT "RUN OF "NNAME$: NORMAL : VTAB 3: POKE
  34,2
510  ONERR  GOTO 540
520  PRINT D$;"UNLOCK"NNAME$
530  PRINT D$;"DELETE"NNAME$
540  POKE 216,0
550  PRINT D$;"EXEC "ENAME$
560  STOP
1000  REM *****
1010  PRINT D$;"READ "NAME$: INPUT SENT
1020  PRINT D$;"READ "NAME$
1030  INPUT SENT$: IF PFLAG = 0 THEN  PRINT D$;"WRITE "ENAME$
1040  IF PFLAG = 1 THEN  INVERSE : PRINT SENT$: NORMAL
1050 SIZE =  LEN (SENT$): IF SENT$ = "END" THEN 200: REM    NATURAL
   FILE END
1060  IF SIZE < 2 THEN 1020: REM     IGNORE TOO SHORT LINES
```

```
1070 K =  VAL (SENT$):MSENT$ = SENT$: REM  THIS IS A LABEL?
1080  IF K < 1 THEN 1130
1090  IF K > 9 THEN  PRINT LNUM"STOP: REM BAD LABEL "SENT$:LNUM =
   LNUM + 10:BAD = BAD + 1: CALL  - 1059: CALL  - 1059: GOTO 1020
1100  IF NL(K) = 2 THEN  PRINT LNUM"STOP;REM DUP. LABEL ";SENT$:LNUM
    = LNUM + 10: GOTO 1020
1110 NL(K) = 2: PRINT CPROC + K;"GOTO ";LNUM
1120 SIZE = SIZE - 1:MSENT$ =  RIGHT$ (MSENT$,SIZE)
1130  GOSUB 1140: GOTO 1020: REM  INTERPRETE PILOT INSTRUCTION
1140 K = 4: IF SIZE < K THEN K = SIZE
1150  FOR L = 1 TO K: IF  MID$ (MSENT$,L,1) = ":" THEN 1170
1160  NEXT L: PRINT LNUM"STOP: REM NO COLON "SENT$:BAD = BAD + 1: CALL
    - 1059: CALL  - 1059:LNUM = LNUM + 10: RETURN
1170 A$ =  MID$ (MSENT$,2,1): IF A$ <  > "N" AND A$ <  > "Y" THEN A$
    =  LEFT$ (MSENT$,1): GOTO 1220: REM     HANDLE Y/N PART
1180  IF L < 3 THEN 1290: REM   BAD SYNTAAX
1190  PRINT LNUM;:FLAG = LNUM + 1:LNUM = LNUM + 10: IF A$ = "Y" THEN
    PRINT "IF FLAG THEN ";LNUM
1200  IF A$ = "N" THEN  PRINT "IF NOT FLAG THEN";LNUM
1210 SIZE = SIZE - 1:MSENT$ =  LEFT$ (MSENT$,1) +  RIGHT$
   (MSENT$,SIZE - 1):L = L - 1:A$ =  LEFT$ (MSENT$,1)
1220  IF L < 2 THEN 1290: REM  BAD SYNTAX
1230  IF A$ = "T" THEN  GOSUB 26010: GOTO 1300: REM     T COMMAND
1240  IF A$ = "G" THEN  GOSUB 40010: GOTO 1300: REM  G COMMAND
1250 M$ = "ABEGJLMRSTUX*"
1260  FOR K = 1 TO 13
1270  IF A$ =  MID$ (M$,K,1) THEN 20010: REM        VALID COMMAND
1280  NEXT K
1290  PRINT LNUM" STOP:REM SYNTAX "SENT$:BAD = BAD + 1: CALL  - 1059
   : CALL  - 1059
1300 LNUM = LNUM + 10: IF FLAG <  > 0 THEN  PRINT FLAG" GOTO "LNUM: REM
    HANDLE ERROR OF Y/N INSTRUCTIONS

1310 FLAG = 0: RETURN

20000  REM *****
20010 SIZE = SIZE - L: IF SIZE < 1 THEN MSENT$ = "": GOTO 20030
20020 MSENT$ =  RIGHT$ (SENT$,SIZE): REM   GET ACTUAL COMMAND
20030  IF A$ = "A" THEN  GOSUB 24040: GOTO 20160
20040  IF A$ = "B" THEN  GOSUB 21010: GOTO 20160
20050  IF A$ = "E" THEN  GOSUB 28010: GOTO 20160
20060  IF A$ = "G" THEN  STOP : REM  CAN'T REACH HERE
20070  IF A$ = "J" THEN  GOSUB 29010: GOTO 20160
20080  IF A$ = "L" THEN  GOSUB 23010: GOTO 20160
20090  IF A$ = "M" THEN  GOSUB 25010: GOTO 20160
20100  IF A$ = "R" THEN  GOSUB 20510: GOTO 20160
20110  IF A$ = "S" THEN  GOSUB 35010: GOTO 20160
20120  IF A$ = "T" THEN  STOP : REM   CAN'T REACH HERE
20130  IF A$ = "U" THEN  GOSUB 27010: GOTO 20160
20140  IF A$ = "X" THEN  GOSUB 22010: GOTO 20160
20150  IF A$ = "*" THEN  GOSUB 30010: GOTO 20160
20160 LNUM = LNUM + 10: IF FLAG <  > 0 THEN  PRINT FLAG" GOTO "LNUM:
    REM  HANDLE Y/N INSTRUCTIONS
20170 FLAG = 0: RETURN
20500  REM *****
20510  PRINT LNUM"REM "MSENT$: RETURN : REM  R-COMMAND
21000  REM *****
21010 M1$ = "": FOR COUNT = 1 TO  LEN (MSENT$):M$ =  MID$ (MSENT$,
   COUNT,1): IF M$ = "'" THEN M$ = QU$
21020 M1$ = M1$ + M$: NEXT : REM  CHANGE ' TO "
21030  PRINT LNUM;M1$: RETURN : REM  B-COMMAND
22000  REM *****
22010  PRINT LNUM"FLAG=0:IF("MSENT$")THEN FLAG=1": RETURN : REM  X C
   OMMAND
23000  REM *****
23010  PRINT LNUM"PRINT D$;"QU$"RUN "MSENT$QU$: RETURN : REM
   L=COMMAND
24030  REM *****
24040  PRINT LNUM"PRINT BELL$;:";: IF SIZE = 0 THEN  PRINT "GOSUB70"
   : RETURN : REM     A-COMMAND
24050  IF SIZE < 3 OR  LEFT$ (MSENT$,1) <  > "$" THEN  PRINT " STOP:
   REM SYNTAX "SENT$:BAD = BAD + 1: CALL  - 1059: CALL  - 1059: RETURN

24060 MSENT$ =  RIGHT$ (MSENT$,SIZE - 1): IF  RIGHT$ (MSENT$,1) <  >
   "$" THEN MSENT$ = MSENT$ + "$": REM  ADD $ IF NEEDED
24070  PRINT "GOSUB 70:"MSENT$"=ANS$": RETURN
25000  REM *****
25010  IF MSENT$ = "" THEN  PRINT LNUM"FLAG=1": RETURN : REM  EMPTY
   MATCH ALWAYS MATCHES
25020 N = 1:M$(1) = ""
25030  FOR K = 1 TO SIZE: REM    FIND WHAT NEEDS MATCHING
25040 M1$ =  MID$ (MSENT$,K,1): IF M1$ = "," THEN M$(N) = QU$ +
   M$(N) + QU$:N = N + 1:M$(N) = "": GOTO 25070
25050  IF M1$ = "$" THEN  GOSUB 25130: GOTO 25070
25060 M$(N) = M$(N) + M1$
25070  NEXT : IF M1$ <  > "$" THEN M$(N) = QU$ + M$(N) + QU$:N =
   N + 1
```


NATIONALLY PROMINENT PR MAN GIVES IT TO YOU STRAIGHT IN
HOW TO STEAL A MILLION $$$$$$$$
IN
FREE PUBLICITY
By Harry Barber
how and where to get all the free publicity you'll ever want

This remarkable book shows you...

- How to professionally prepare news releases and articles so they will be accepted by the media.
- How to develop your mailing lists.
- How to work with the news media.
- How to measure the effectiveness of your publicity
- Dozens of ways to secure additional publicity at nominal cost.
- Over 600 outlets for free publicity and reference to thousands of additional sources.

In this comprehensive publicity guide, Harry Barber eliminates the mystique of "free publicity"—shows you in detailed, step-by-step procedures, how and where to get it—all the free publicity you'll ever want for yourself or your organization.

How To Steal A Million $ In Free Publicity is the ideal reference guide for business owners, corporate executives, political groups, non-profit organizations, and individuals in all walks of life.

About the author—
Nationally prominent advertising and public relations executive, Harry Barber, gives it to you straight in his latest book.

The author has developed hundreds of publicity campaigns in conjunction with screen and television personalities, US Astronauts, USAC Racing, major corporations, and private individuals.

Only $14.95 postpaid
SATISFACTION GUARANTEED!

Success Sellers
Publishers & Booksellers
P.O. Box 16801
Irvine, CA 92713

Please rush me a copy of Harry Barber's book, *HOW TO STEAL A MILLION $ IN FREE PUBLICITY*. I enclose $14.95.

Name ____________

Address ____________

City ____________

State ____________ Zip ____________

CIRCLE 309 ON READER SERVICE CARD

INVESTMENT SOFTWARE FOR

THE INTELLIGENT INVESTOR™

Series I

- **Calculates**
  - Time Weighted Rates of Return
  - Dollar Weighted Rates of Return
  - Portfolio Yields
  - Traditional 1-10 year time spans plus User Defined Specific Periods
- **Evaluates**
  - Your Investment Decisions In Terms of Alternatives
  - Your Investment Recommendations & Decisions
- **Keeps Records of All**
  - Investments
  - Cash Additions & Withdrawals
  - Quarterly Portfolio Valuations
  - Dividends & Interest
  - Brokerage Commissions
  - Margin Expenses
- **Tells You**
  - Who Made More from Your Account — You or Your Stockbroker
- **Is**
  - Error-Tolerant and Trouble Free for Use by the Computer Novice
  - User Friendly — Menu Driven
- **Utility**
  - All Investment Media — Stocks, Bonds, Real Estate, Commodities, Options, Etc.
- **Tax Deductible**
  - Consult Your Accountant for Requirements

$75

* * * * *

AVAILABLE FOR:

APPLE III & APPLE II (APPLESOFT)
TRS-80
IBM PERSONAL COMPUTER
NEC PC 8000

ROBERT GENTRY & Associates, Ltd.
810 Camelview Plaza
6900 East Camelback Road
Scottsdale, Arizona 85251
(602) 941-5212

PLEASE ADD $3.00 SHIPPING & HANDLING

Telephone Orders Accepted on Visa or Mastercharge

CIRCLE 183 ON READER SERVICE CARD

Pilot-To-Basic, continued...

```
25080 N = N - 1: IF N = 0 THEN  RETURN
25090  PRINT LNUM" FLAG=0":LNUM = LNUM + 10
25100 JPT = LNUM + N * 10: REM  JUMP WHEN MATCHED
25110  FOR K = 1 TO N: PRINT LNUM" CHECK$= "M$(K)":GOSUB 10: IF FLAG
   =1 THEN "JPT:LNUM = LNUM + 10: NEXT :LNUM = LNUM - 10: RETURN
25120  REM  HANDLE VARIABLES
25130 K = K + 1: IF K > SIZE THEN  RETURN
25140  FOR K1 = K TO SIZE:M1$ =  MID$ (MSENT$,K1,1): IF M1$ = "," THEN
   K = K1 + 1: GOTO 25170
25150  IF M1$ = "$" THEN K = K1 + 2: GOTO 25170
25160 M$(N) = M$(N) + M1$: NEXT :K = K1 + 1
25170 M$(N) = M$(N) + "$": IF  LEN (M$(N)) = 1 THEN M$(N) = "":M1$ =
   "$": RETURN : REM   PROBABLY A SYNTAX ERROR THAT IS IGNORABLE
25180 N = N + 1:M$(N) = "":M1$ = "$": RETURN
26000  REM *****
26010 HANG = 0:REVERSE = 0: PRINT LNUM;: REM     T INSTRUCTION
26020  IF L = 2 THEN 26100
26030 A$ =  MID$ (MSENT$,2,1): IF A$ = "C" THEN  PRINT "HOME:";: GOTO
   26100
26040  IF A$ = "I" THEN  PRINT "INVERSE:";:REVERSE = 1: GOTO 26100
26050  IF A$ = "H" THEN HANG = 1: GOTO 26100
26060  IF  LEN (MSENT$) < 4 OR A$ <  > "V" THEN 26090
26070 MSENT$ =  RIGHT$ (MSENT$, LEN (MSENT$) - 3):MSENT =  VAL (MSENT$):
   IF MSENT < 1 OR MSENT > 20 THEN 26090
26080  PRINT "VTAB "MSENT + 3: RETURN
26090  PRINT "STOP:REM SYNTAX "SENT$:BAD = BAD + 1: CALL  - 1059: CALL
    - 1059: RETURN
26100  IF L = SIZE THEN  PRINT "PRINT": RETURN : REM  BLANK LINE
26110 SIZE = SIZE - L:MSENT$ =  RIGHT$ (MSENT$,SIZE)
26120 N = 1:M$ = QU$: PRINT "PRINT";:QU = 1: REM    WATCH THE QUOTES
26130  IF  LEFT$ (MSENT$,1) <  > "$" THEN M$ = QU$:QU = 1
26140  FOR K = 1 TO SIZE:M1$ =  MID$ (MSENT$,K,1): IF M1$ <  > "$" THEN
   M$ = M$ + M1$: GOTO 26170
26150  IF QU = 1 THEN QU = 0:M$ = M$ + QU$: GOTO 26170
26160 QU = 1:M$ = M$ + M1$ + QU$
26170  NEXT
26180  IF  RIGHT$ (SENT$,1) <  > "$" AND QU = 1 THEN M$ = M$ + QU$: GOTO
   26200
26190  IF  RIGHT$ (SENT$,1) <  > "$" AND QU = 0 THEN M$ = M$ + "$"
26200  PRINT M$;: IF HANG = 1 THEN  PRINT QU$" "QU$";": GOTO 26220
26210  PRINT
26220  IF REVERSE = 1 THEN LNUM = LNUM + 10: PRINT LNUM"NORMAL"
26230  RETURN
27000  REM *****
27010  IF NP = 0 THEN  GOTO 27040: REM  U-COMMAND
27020  FOR K = 1 TO NP: IF NP$(K,0) = MSENT$ THEN  PRINT LNUM"GOSUB
   "NP$(K,1): RETURN
27030  NEXT K
27040 NEED = NEED + 1:NEED$(NEED,0) = MSENT$:NEED$(NEED,1) =  STR$
   ( - LNUM): RETURN : REM   STORE THE NOT-FOUND PROCEDURE LABEL
28000  REM *****
28010  FOR K = 1 TO 9: REM  E-INSTRUCTION CLOSE OFF LABELS
28020  IF NL(K) = 1 THEN  PRINT CPROC + K;"STOP: REM NO LABEL "K:BAD
    = BAD + 1: CALL  - 1059: CALL  - 1059
28030 NL(K) = 0: NEXT
28040  IF NL(10) = 2 THEN  PRINT CPROC + 10" GOTO "LNUM:NL(10) = 3: REM
    DIRECT END JUMPS
28050  REM  END OF MAIN PROCEDURE?
28060  IF LNUM < 30000 THEN  PRINT LNUM" PRINT D$"QU$"RUN HELLO"QU$:
   LNUM = 30000 - 10: RETURN
28070  PRINT LNUM;"RETURN":LNUM = 1000 *  INT ((LNUM + 1000) / 1000)
    - 10: RETURN
29000  REM *****
29010 K =  VAL (MSENT$): REM   J INSTRUCTION
29020  IF K < 1 THEN 29070: REM  FOUND PROCEDURE CALL
29030  IF K > 9 THEN  PRINT LNUM" STOP: REM BAD LABEL "SENT$:BAD =
   BAD + 1: CALL  - 1059: CALL  - 1059: RETURN
29040  PRINT LNUM" GOTO "CPROC + K
29050  IF NL(K) <  > 2 THEN NL(K) = 1: REM  SHOW THAT LABEL USED
29060  RETURN
29070  IF MSENT$ = "E" THEN  PRINT LNUM" GOTO "CPROC + 10:NL(10) = 2
   : RETURN : REM  JUMP TO AN END
29080  IF NP = 0 THEN 29110: REM  FIND THE PROCEDURE
29090  FOR K = 1 TO NP: IF NP$(K,0) = MSENT$ THEN  PRINT LNUM" GOTO
   "NP$(K,1): RETURN
29100  NEXT
29110 NEED = NEED + 1:NEED$(NEED,0) = MSENT$:NEED$(NEED,1) =  STR$
   (LNUM): RETURN : REM   STORE THE NOT-FOUND PROCEDURE LABEL
29120  REM  STORE NOT FOUND PROCEDURE
30000  REM *****
30010  FOR K = 1 TO 9: REM  *-COMMAND
30020  IF NL(K) = 1 THEN  PRINT CPROC + K:" STOP: REM NO LABEL "K":
   BAD=BAD+1:CALL-1059:CALL-1059
30030 NL(K) = 0: NEXT
30040  IF NL(10) = 1 THEN  PRINT CPROC + 10" GOTO "LNUM: REM  DIRECT
    END JUMP
30050 NL(10) = 0:CPROC = LNUM
30060  IF NP = 0 THEN 30090
```

NO WAITING

Microfazer
QUADRAM
CORPORATION

Now, with Microfazer you can compute while you print.

Time is money. You own a computer system because you know that it can save you money by simplifying office procedures and reducing the time involved in payrolls, accounting, word processing and those other wonderful things we all must do. Time is an important resource which should not be wasted. Even though your system seems efficient, you could be wasting valuable time if you ever wait for your printer to finish printing before more information can be entered into your computer.

NO WAITING. Now with Microfazer by Quadram there will be no more waiting.

The Microfazer is an inexpensive universal printer/buffer that can be used with all popular micro-computers and parallel printers. Microfazer receives information from the computer at up to 4000 characters per second (your computer thinks the printer is printing this fast), holds it until your printer can handle it, and then sends it on to the printer. Controlled by a custom LSI, Microfazer uses standard centronics signals and is powered by the printer or an inexpensive external AC adapter. Buffering of 8K, 16K, 32K or 64K is available.

EASY INSTALLATION. The Microfazer is in a small case (3.5" x 7" x 1"). It is engineered to be plugged directly into the input port of the Epson and other similar printers. Installation can be completed in less than 60 seconds. How's that for not wasting time! Most other centronics compatible printers can be attached by using an adapter cable.

FLEXIBLE. If you should purchase a faster printer later, just unplug and add to your new printer. Changing Computers? Microfazer is not computer dependent. Want to add more buffer? No problem. Microfazer is user-expandable up to 64K. No other buffers come close in flexibility.

LOW PRICE. Only $159 for 8K buffer, $199 (16K), $225 (32K) and $299 for full 64K. Serial-to-Parallel and Serial-to-Serial versions are available at slightly higher prices.

QUADRAM QUALITY. The Microfazer was designed with performance and reliability in mind. With a one year warranty, you get Quadram Quality at a surprisingly low price.

ASK YOUR DEALER. If you are currently wasting time waiting on your printer, see your local personal computer dealer. If your dealer is not currently stocking Quadram products, have them call us at (404) 923-6666.

QUADRAM
CORPORATION
4357 Park Drive/Norcross, Ga. 30093

CIRCLE 248 ON READER SERVICE CARD

TRS-80 DISCOUNT COMPUTERS

CALL US LAST for the **LOWEST** price!

918-825-4844

it will be worth the call!

AMERICAN Small Business COMPUTERS
118 S. MILL ST. PRYOR, OK. 74361

CIRCLE 108 ON READER SERVICE CARD

EDUCATIONAL SOFTWARE
TRS-80, COLOR COMPUTER, PET & APPLE II

ELEMENTARY **MATH**
SCIENCE **HISTORY**
GEOGRAPHY **ACCOUNTING**
ECONOMICS **BUSINESS ED.**
FOREIGN LANG. **PHYSICS**
GRAMMAR **FARM RECORDS**

Write for FREE Catalogue:

MICRO LEARNINGWARE, Box 2134, N Mankato, MN 56001
(507) 625-2205
VISA & MASTER CARD ACCEPTED

We pay 15% royalty for Educational Programs listed with us.
TRS-80 is a registered trademark of TANDY CORP.
PET is a trademark of COMMODORE BUS. MACHINES.
APPLE is a trademark of APPLE COMPUTER CO.

CIRCLE 209 ON READER SERVICE CARD

TYC Teach Yourself by Computer Software™

Teach Yourself by Computer (TYC) Software® is one of the oldest companies specializing in educational software for microcomputers. Our software has been successfully used in schools and homes throughout the country.

EDUCATIONAL PROGRAMS are available on all subjects and grade levels for the TRS-80** and APPLE* microcomputers.

TYC Software® also provides specialized consulting services and work shops for schools and professional groups.

For more information write to:
TYC Software®
40 Stuyvesant Manor
Geneseo, New York 14454
(716)243-3005

*Trademark of Apple Computer, Inc.
**Trademark of Tandy Corp.

CIRCLE 292 ON READER SERVICE CARD

Pilot-To-Basic, continued...

```
30070  FOR K = 1 TO NP: IF NP$(K,0) = MSENT$ THEN  PRINT LNUM" STOP:
   REM DUP PROCEDURE "SENT$:BAD = BAD + 1: CALL  - 1059: CALL  - 105
   9: RETURN
30080  NEXT
30090 NP = NP + 1
30100 NP$(NP,0) = MSENT$:NP$(NP,1) =  STR$ (LNUM): PRINT LNUM"GOTO"
   LNUM + 20":REM PROCEDURE "MSENT$
30110 LNUM = LNUM + 10: RETURN
31010 Y =  LEN (MSENT$): IF Y > 2 THEN 40230
35000  REM *****
35010  IF SOUND = 1 THEN 35040
35015  PRINT"1949 SOUND=778:FOR K=0TO21:READX:POKE(SOURD+K),X:NEXTK"
35020  PRINT 1950"DATA 169,20,133,7,173,48,192,136,208,4,198,7,240,7
   ,202,208,246,162,23,208,239,96:REM LOAD SOUND ROUTINE"
35030  PRINT LNUM;: GOSUB 40200: IF OK = 0 THEN  RETURN : REM  ERROR
35040  PRINT "POKE(SOUND+18),"X":POKE (SOUND+1),"Y":CALL SOUND": RETURN
40000  REM *****
40010  PRINT LNUM;:A$ =  MID$ (MSENT$,2,1): IF  LEN (MSENT$) < 4 THEN
   40150
40020 SIZE = SIZE - L:MSENT$ =  RIGHT$ (MSENT$,SIZE)
40030  IF A$ <  > "S" THEN 40080
40040  PRINT "ONERR GOTO "LNUM + 30: PRINT LNUM + 20"PRINTCHR$(4);" CHR$
   (34)"BLOAD "MSENT$ CHR$ (34)":GOTO "LNUM + 50: REM   BE ABLE TO
   ERROR RECOVER
40050  PRINT LNUM + 30"PRINT "QU$"PICTURE "MSENT$" NOT FOUND "QU$":FOR
   K=1TO2000:NEXTK"
40060  IF LNUM > 30000 THEN  PRINT LNUM + 40"CALL 768": REM   APPLESOFT
   PATCH FOR ERROR RECOVER IN SUBROUTINES
40070 LNUM = LNUM + 50: PRINT LNUM"POKE 216,0": RETURN
40080  IF A$ <  > "P" AND A$ <  > "L" THEN 40180
40090  GOSUB 40200: IF OK = 0 THEN  RETURN : REM  GET VALUES
40100  IF X < 0 OR X > 100 THEN X = 0
40110  IF Y < 0 OR Y > 100 THEN Y = 0
40120 X = X * 2.75:Y = 160 - Y * 1.55
40130  IF A$ = "P" THEN  PRINT "HPLOT "X","Y: RETURN
40140  IF A$ = "L" THEN  PRINT "HPLOT TO "X","Y: RETURN
40150  IF A$ = "Q" THEN  PRINT "TEXT": RETURN
40160  IF A$ = "C" THEN  PRINT "HGR": RETURN
40170  IF A$ = "O" THEN  PRINT "HGR : HCOLOR=3:VTAB21": RETURN
40180  PRINT "STOP: REM SYNTAX ERROR "SENT$: CALL  - 1059: CALL  - 1
   059:BAD = BAD + 1: RETURN
40190  REM  FIND TWO NUMBERS INSIDE MSENT$ SEPARATED BY BLANK OR COMMA
40200 OK = 1:X =  VAL (MSENT$)
40210 Y =  LEN (MSENT$): IF Y > 1 GOTO 40230
40220 OK = 0: PRINT "STOP : REM NEEDS TWO NUMBER "SENT$:BAD = BAD +
   1: CALL  - 1059: CALL  - 1059: RETURN
40230  FOR J = 1 TO Y - 1: IF  MID$ (MSENT$,J,1) <  > " " THEN 40250
40240  NEXT J: GOTO 40220: REM    ERROR
40250  FOR K = J TO Y - 1:M$ =  MID$ (MSENT$,K,1): IF M$ = " " OR M$
    = "," THEN Y =  VAL ( RIGHT$ (MSENT$,Y - K)): RETURN
40260  NEXT K: GOTO 40220
50000  REM *****
50010  REM  CAUSE THE LOADING OF MATCH SUBROUTINE
50020  IF PFLAG = 1 THEN  RETURN
50030  IF PFLAG = 0 THEN  PRINT D$;"WRITE "ENAME$
50040  PRINT "NEW": PRINT "1SPEED=160: POKE34,0: HOME : INVERSE : PR
   INT"QU$"LESSON " RIGHT$ (NAME$, LEN (NAME$) - 6)QU$";VTAB4:POKE34,3:
   NORMAL:GOTO60000"
50050  PRINT "10 FLAG=0: LCHECK=LEN(CHECK$):LANS=LEN(ANS$):REM MATCH
    SUBROUTINE"
50060  PRINT "20 IF LANS=0 OR LCHECK=0 OR LANS < LCHECK THEN RETURN"

50070  PRINT "30 IF ANS$=CHECK$ THEN FLAG=1:RETURN"
50080  PRINT "40 FOR L1=1 TO LANS-LCHECK+1: FOR L2=1 TO LCHECK"
50090  PRINT "50 IF MID$(CHECK$,L2,1)<>MID$(ANS$,L1-1+L2,1)THEN NEXT
    L1:RETURN"
50100  PRINT "60 NEXT L2:FLAG=1:L1=1000:NEXTL1:RETURN"
50110  PRINT "70ANS$="QU$QU$
50120  PRINT "80GETA$:IFA$="QU$QU$"THEN80"
50125  PRINT "85 IF ((LEN(ANS$) = 0) AND(A$=CHR$(8)))THEN 80"
50130  PRINT "110 IF A$=CHR$(8) THEN PRINT"QU$"  "
   QU$"CHR$(8);:ANS$=LEFT$(ANS$,LEN(ANS$)-1):GOTO80"
50140  PRINT 100"IF(A$=CHR$(8)ORA$=CHR$(24))ANDLEN(ANS$)<2THEN70"
50150  PRINT "110IFA$=CHR$(8)THENPRINTCHR$(8)"QU$" "QU$"CHR$(8):ANS$
   =LEFT$(ANS$,LEN(ANS$)-1):GOTO80"
50160  PRINT "120 IF A$=CHR$(24)THENFORJ=1TOLEN(ANS$):PRINTCHR$(8)"Q
   U$" "QU$"CHR$(8);:NEXT:GOTO70"
50170  PRINT "130ANS$=ANS$+A$:GOTO80"
50180  PRINT "1900 GOTO 1920":LNUM = 2000
50190  PRINT "60000 HOME:VTAB 6:PRINT"QU$"LESSON " RIGHT$ (NAME$, LEN
   (NAME$) - 6)QU$
50200  PRINT "60010 VTAB10:PRINT "QU$"GENERATED USING PILOT->BASIC"Q
   U$":PRINT :PRINT"QU$"M. SMITH FEB 1982"QU$
50210  PRINT "60020 FOR J=1 TO 3000:NEXTJ"
50220 K = 60030
50230  PRINT K"BELL$=CHR$(7): REM BELL CHARACTER":K = K + 10
50240  PRINT K"D$ =CHR$(4):REM DISK CONTROL":K = K + 10
50250  PRINT 1920"FOR K = 0 TO 9 : READ X: POKE (768 + K),X:NEXTK"
```

```
50260  PRINT 1930"DATA104,168,104,166,223,154,72,152,72,96:REM ONERR
    PATCH"
50280  PRINT K" HOME: GOTO 1900": RETURN
59900  STOP
60000  REM *****
60010  REM  NAMES AND INITIALIZATION
60020 SENT$ = "": REM  CURRENT PILOT SENTENCE
60030 MSENT$ = "": REM  MODIFIED SENTENCE
60040 SIZE = 0: REM   LENGTH(MSENT$)
60050 LNUM = 1900: REM    CURRENT LINE NUMBER
60060 J = 0:K = 0:L = 0:N = 0:X = 0: REM  DUMMY VARIABLES
60070  FOR K = 1 TO 10:NL(K) = 0: NEXT : REM   LABELS IN USE
60080 CPROC = 1900: REM   CURRENT PROCEDURE
60090 A$ = "": REM  DUMMY VARIABLE
60100 FLAG = 0: REM  FLAG CONTROL OF Y/N INSTRUCTION
60110 BAD = 0: REM  FLAG FOR BAD SYNTAX
60120 D$ =  CHR$ (4): REM   CONTROL-D
60130 QU = 0: REM  CHECK ON PAIRS OF QUOTES
60140 QU$ =  CHR$ (34): REM  QUOTE "
60150 BELL$ =  CHR$ (7): REM  BELL
60160 HANG = 0: REM  CONTROL OF <CR> IN T INSTRUCTION
60170  DIM M$(30): REM  DUMMY STORAGE USED IN M INSTRUCTION
60180 M1$ = "": REM  DUMMY VARIABLE USED IN M-INSTRUCTION
60190 NP = 0: REM  NUMBER OF PROCEDURES DEFINED
60200  DIM NP$(30,1): REM  PROCEDURE NAMES AND LINENUMS
60210 NEED = 0: REM   UNDEFINED PROC
60220  DIM NEED$(60,1): REM  UNDEFINED PROC AND WHERE CALLED.  +VE
   CALL NEEDS GOTO, -VE CALL NEEDS GOSUB
60230 NAME$ = "": REM  PILOT.NAME$ IS CURRENT PROGRAM NAME
60240 ENAME$ = "": REM  EXEC.ENAME$ IS CURRENT OUTPUT FILE
60250 PFLAG = 0: REM  PRINTS TO SCREEN AS OUTPUT WHEN SET
60260 LW = 2000: REM     LOOP WAIT FOR LOOPS
60270 SOUND = 0: REM  CONTROLS LOADING OF SOUND ROUTINES
60280 REVERSE = 0: REM  CONTROLS INVERSE USE IN T-INSTRUCTION
61000  HOME : VTAB 10: PRINT "PILOT-BASIC CONVERTER": PRINT : PRINT
   "M.R.SMITH   FEB 1982"BELL$BELL$: FOR J = 1 TO LW: NEXT J
61010  HOME : VTAB 10: GOTO 20
62000  REM *****
62010  HOME : VTAB 10: PRINT "CHECK SYNTAX ONLY "BELL$;: INPUT A$: IF
    LEFT$ (A$,1) = "Y" THEN PFLAG = 1: RETURN
62020  IF  LEFT$ (A$,1) <  > "N" THEN  PRINT BELL$BELL$: GOTO 62010
62030 PFLAG = 0: RETURN
```

SRA Educational Courseware: "Because learning matters"

Micro Discovery™ (Grade 4 and up)
For your Apple*, IBM*, or Radio Shack* personal computers.

A complete introduction to the personal computer for grades 4 and up. Gives practical, hands-on experience with computers and presents the basics of

- theory
- operation
- programming
- the computer and society

2 Diskettes, 20 copies of Student Workbook, and Instructor's Guide, $190.00.

*Registered trademarks.

☐ Yes! I want Micro Discovery! Please contact me immediately.
☐ Send me literature about Micro Discovery.

Name__________
School__________
Address__________
City, State, Zip__________
Telephone__________

For faster service, call SRA toll-free:
(800) 621-0476
Or mail this coupon to:

SRA®

SCIENCE RESEARCH ASSOCIATES, INC.
155 N. Wacker Drive, Chicago, IL 60606

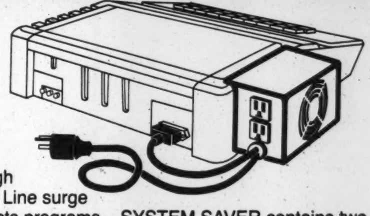
CIRCLE 274 ON READER SERVICE CARD

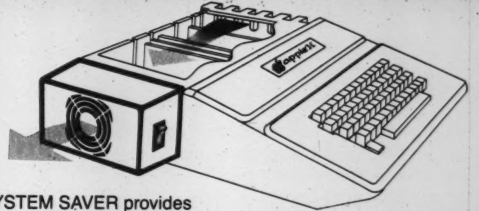
Make your Apple II® shine with all new SYSTEM SAVER™

- LINE SURGE SUPPRESSION
- QUIET COOLING FAN
- DUAL AUXILIARY OUTLETS
- FRONT POWER SWITCH

COLOR MATCHED. SIMPLY HANGS ON APPLE

UL Approved





Power input through SYSTEM SAVER. Line surge suppression protects programs and data by smoothing out dangerous power surges and spikes.

SYSTEM SAVER contains two switched power outlets. You can control your printer and monitor from the front mounted switch.

SYSTEM SAVER provides correct cooling. Fresh air is drawn across the mother board, over the power supply and out the ventilation slots.

Convenient front mounted heavy-duty power switch with pilot light. Switch controls SYSTEM SAVER, Apple II, and both rear outlets.

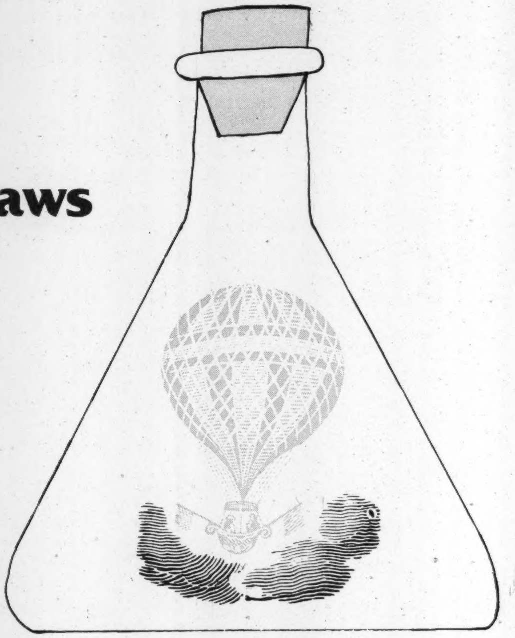
$89^95 at your local dealer or order direct by phone or mail from:

Dealer inquiries invited.

Kensington Microware Ltd.
300 East 54 Street
Suite 3L
New York, N Y 10022
(212) 486-2802

When ordering by mail include payment of $89.95 plus $2.50 for handling. New York State residents add 5¼% sales tax. By phone payment can be charged to VISA or MASTERCARD.

CIRCLE 305 ON READER SERVICE CARD



Demonstrating the Gas Laws

David A. Holko

Gas laws frequently present problems for students studying General Chemistry. One reason for the difficulty is the student's inexperience in working with gases in a laboratory.

The concepts involving an ideal gas confined to a container where pressure on the gas, temperature of the gas, or number of moles of gas can be controlled remain nebulous even when examples of tire pumps, aerosol cans, balloons or lab bottles are explained.

This program, when used as a student activity, attempts to demonstrate the relationship between volume and pressure for Boyle's Law, volume and temperature for Charles's Law, or volume and moles of gas for Avagadro's Law.

Initially, the student selects the law which is to be demonstrated. The video monitor shows a simple cylinder, and positions the piston, which traps a volume of gas and is ready to respond to changes in temperature, pressure, or moles of gas confined respective of the law chosen.

When an increase or decrease is entered, the piston moves, correspondingly, showing the effect on the volume of confined gas. The changes are calculated using the ideal gas law V = nRT/P where V is volume, n is the number of moles of gas, R the universal gas constant, T the temperature and P the pressure.

If the student graphs the computer calculated values, checks the values by doing hand calculations, or closely analyzes the values calculated by the computer, the relationship of molar gas volume at Standard Temperature and Pressure may become obvious.

The advanced student, via graphing and analysis, can be led to determine the actual value of R, the Universal Gas constant, by using the computer simulation as an experimental apparatus.

There is a minimum volume the cylinder will hold. This design was effected to allow graphic extrapolation of the data to determine the value of Absolute Zero with Charles's Law.

The programming is simple and short, written to aid and reinforce the student's application of the gas laws and equate a simulated moving piston to theoretical values derived using the ideal gas law. ☐

```
  1 'GAS LAWS VERSION 3.0  WRITTEN BY DAVID A. HOLKO
 2 CLS:
   B$="###.###":
   PP=1:
   R=.082056:
   N=1:
   T=273.15:
   N(1)=1:
   N(2)=40:
   N(3)=1:
   V$(1)="GAS PRESSURE":
   V$(2)="GAS TEMPERATURE":
   V$(3)="MOLES OF GAS":
   F(1)=.01:
   F(2)=9:
   F(3)=.025
 3 PRINT"1 BOYLES LAW":
   PRINT"2 CHARLES LAW":
   PRINT"3 AVOGADRO'S LAW":
   INPUT"CHOOSE FROM THE ABOVE LAWS";C:
   IFC>3ORC<1THENCLS:
   GOTO3    ELSECLS
 4 PRINT@70,"GAS CYLINDER WITH PISTON  ";:
   PRINTCHR$(92);:
 5 FORX=1TO120:
   SET(X,8):
   SET(X,14):
   NEXTX:
   FORX=9TO14:
   SET(1,X):
   SET(2,X):
   NEXTX
```

David A. Holko, 642 N. River Dr. #102, Stuart, FL 33494.

electronic GAMES

We're HOT!

ired up about the country's fastest-growing obby? Are you an Atari addict, a Donkey Kong evotee, a Z-80 zealot, a Robotron rouser? ELEC-RONIC GAMES—the first and foremost agazine devoted exclusively to videogames, omputer, stand-alone, and arcade games—is *the* ed-hot guide for players who play to win. Each onthly issue brings you previews and reviews of ll the newest games, from space to sports, battles maze chases. The latest in controllers and other aming equipment. And most important, the valable playing strategy you need to play better, core higher, blast the enemy, slay the dragon . .be a winner!

Players Guide to Video Maze Games

electronic GAMES

ideogames·Computer Games·Stand-Alone Games·Arcades

VIDEO-GAMING MEETS POP CULTURE!

Oh! Othello

BETTER CONTROL FOR YOUR GAMES Improve Your Score With a Custom Joystick

NO 'DRAGON' YOUR FEET!

WIN WITH electronic GAMES

Pick up the September issue, on sale now at your favorite newsstand. Or use the coupon to cash in on savings and get **ELECTRONIC GAMES** home-delivered.

Mail to: **ELECTRONIC GAMES**
Subscriber Services
P.O. Box 1128, Dover, New Jersey 07801

OK, enter my subscription to ELECTRONIC GAMES!

☐ Send me 12 issues (1 year) for $28.
(I save $7.40 on the newsstand cost)

☐ Increase my savings! Send me 24 issues (2 years) for $48.
(I save $22.80 on the newsstand cost)

Name..
(please print)

Address...

City.......................................State.........................Zip.........................

☐ Enclosed is my payment of $__________ ☐ Bill me later

For Canada: 12 issues, $32.00, U.S. funds. For all other countries: 12 issues (Air Mail delivery only), $64, U.S. funds. Please allow up to 60 days for delivery of your first copy.

1C1029

SRA Educational Courseware: "Because learning matters"

Computer Drill and Instruction: Mathematics (Grades 1-6)
For your Apple* and Atari* personal computers.

An outstanding program of drill and instruction in basic arithmetic skills. Can provide student placement, monitor progress, keep performance records, and generate seatwork at each learner's own level of skill.

Level A—Grades 1 and 2, $365.00
Level B—Grades 3 and 4, 495.00
Level C—Grades 5 and 6, 575.00
Levels A-C, Complete, 1195.00

Each level includes Binder with Lesson Diskettes and Teacher's Guide, plus Manager's Pack with Teacher and Student Diskettes. *Registered trademarks.

☐ Yes! I want CDI: Mathematics!
Please contact me immediately.
☐ Send me literature.

Name ____________
School ____________
Address ____________
City, State, Zip ____________
Telephone ____________

For faster service, call SRA toll-free:
(800) 621-0476

SRA®
SCIENCE RESEARCH ASSOCIATES, INC.
155 N. Wacker Drive, Chicago, IL 60606

CIRCLE 275 ON READER SERVICE CARD

Gas Laws, continued...

```
 6 IFC=1THENPRINT@778,"PRESSURE     ";:
   PRINTUSINGB$;N(C);:
   PRINT"  ATM";
 7 PRINT@714,"VOLUME       ";:
   PRINTUSINGB$;V;:
   PRINT"  LITERS";
 8 IFC=2THENPRINT@778,"TEMPERATURE ";:
   PRINTUSINGB$;N(C);:
   PRINT"  DEGREES K";
 9 IFC=3THENPRINT@778,"MOLES OF GAS";:
   PRINTUSINGB$;N(C);:
   PRINT"  MOLES";
10 PRINT@900,"TYPE <I> TO INCREASE OR <D> TO DECREASE THE ";V$
   (C);".";
11 R$(1)="THE PRESSURE ON THE GAS IS APPLIED BY THE PISTON."
12 R$(3)="THE MASS OF GAS IN THE CYLINDER CAN BE CHANGED."
13 H$(3)="PRESSURE & TEMPERATURE ARE HELD CONSTANT AT STF."
14 R$(2)="THE TEMPERATURE OF THE CYLINDER HOLDING THE GAS CAN
   BE CHANGED."
15 H$(2)="ONE MOLE OF GAS & STD. PRESSURE ARE HELD CONSTANT."
16 H$(1)="ONE MOLE OF GAS & STD. TEMPERATURE ARE HELD CONSTANT
   ."
17 PRINT@448,R$(C);:
   PRINT@512,H$(C):
   IFZZ=0THENGOTO21
18 PRINT@980,"TYPE <R> TO RERUN PROGRAM.";
19 A$=INKEY$:
   IFLEN(A$)=0:
   GOTO19
20 IFA$="I"THENN(C)=N(C)+F(C)ELSEIFA$="D"THENN(C)=N(C)-F(C)ELS
   EIFA$="R"THENRUNELSEGOTO19
21 IFC=1THENV=(N*R*T)/N(1)
22 IFC=2THENV=(N*R*N(C))/PP
23 IFC=3THENV=(N(C)*R*T)/PP
24 ZZ=1:
   P=V+200:
   IFP<201THENGOTO26   ELSEIFP>24[illegible]HENGOTO27   ELSEGOSUB25   :
   GOTO6
```

More Workhorse Programs for your computer to play with!

With these Creative Software home programs your Atari® or Vic® can start playing in the real world:

HOUSEHOLD FINANCE
- 15 income & expense categories
- Budgeting
- Monthly & yearly accounting
- Indicate tax deductible items
- Produce tables & graphs
- $34.95 cassette
- $39.95 disk

LOAN ANALYZER
- Amortization tables
- Compute interest charges
- Compare various loans
- Analyze loan terms
- Manipulate loan parameters
- $14.95 cassette
- $19.95 disk

HOME INVENTORY
- Catalog your possessions
- User-definable categories
- Search catalog for items
- Record serial #, purchase price
- Compute the value of items
- $19.95 cassette
- $24.95 disk

DECISION MAKER
- Decide between alternatives
- Compute recommended choices
- Manipulate decision parameters
- Weigh influencing factors
- Save decisions on tape or disk
- $19.95 cassette
- $24.95 disk

CAR COSTS
- Record maintenance costs
- Itemize insurance payments
- Track fuel consumption
- Summarize all costs to date
- Compute cost of a trip
- $19.95 cassette
- $24.95 disk

CREATIVE SOFTWARE
A Division of ASCI, Inc.

201 San Antonio Circle, #270
Mountain View, CA 94040
(415) 948-9595

Ask about our many other recreational and home applications! TO ORDER: VISA/MasterCard, check or money order accepted. If charge, please include expiration date of card. Add $1.50 for shipping and handling. California residents add sales tax.

```
25 PRINT@P,CHR$(191)::
   PRINT@P+64,CHR$(191)::
   PRINT@P-1,CHR$(128)::
   PRINT@P+63,CHR$(176)::
   PRINT@P+1,CHR$(128)::
   PRINT@P+65,CHR$(176)::
   PRINT@P+1,CHR$(176):CHR$(93)" PISTON  "::
   PRINT@P+120,"  ":CHR$(91):" TRAPPED GAS "::
   RETURN
26 IFC=3ORC=2THENPRINT@512,"THE MINIMUM VOLUME OF THIS CYLINDE
   R HAS BEEN REACHED."::
   GOTO19   ELSEPRINT@512,"THE MAXIMUM PRESSURE THIS PISTON CA
   N EXERT HAS BEEN REACHED."::
   GOTO19
27 PRINT@512,"THE MAXIMUM VOLUME FOR THIS CYLINDER HAS BEEN RE
   ACHED."::
   GOTO19
```

```
      GAS CYLINDER WITH PISTON  \
################################################################
##                         ###] PISTON
################################################################
                        [ TRAPPED GAS

THE PRESSURE ON THE GAS IS APPLIED BY THE PISTON.
ONE MOLE OF GAS & STD. TEMPERATURE ARE HELD CONSTANT.


          VOLUME       22.414  LITERS
          PRESSURE      1.000  ATM

    TYPE <I> TO INCREASE OR <D> TO DECREASE THE GAS PRESSURE.
                    TYPE <R> TO RERUN PROGRAM.
```

BOYLE'S LAW SCREEN

```
      GAS CYLINDER WITH PISTON  \
################################################################
##        ###] PISTON
################################################################
     [ TRAPPED GAS

THE TEMPERATURE OF THE CYLINDER HOLDING THE GAS CAN BE CHANGED.
ONE MOLE OF GAS & STD. PRESSURE ARE HELD CONSTANT.


          VOLUME        3.282  LITERS
          TEMPERATURE  40.000  DEGREES K

    TYPE <I> TO INCREASE OR <D> TO DECREASE THE GAS TEMPERATURE.
                    TYPE <R> TO RERUN PROGRAM.
```

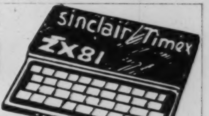
CHARLES' LAW SCREEN

```
      GAS CYLINDER WITH PISTON  \
################################################################
##                         ###] PISTON
################################################################
                        [ TRAPPED GAS

THE MASS OF GAS IN THE CYLINDER CAN BE CHANGED.
PRESSURE & TEMPERATURE ARE HELD CONSTANT AT STP.


          VOLUME       22.414  LITERS
          MOLES OF GAS  1.000  MOLES

    TYPE <I> TO INCREASE OR <D> TO DECREASE THE MOLES OF GAS.
                    TYPE <R> TO RERUN PROGRAM.
```

AVAGADRO'S LAW SCREEN

RAM
For ATARI
48K RAM BOARD FOR THE 400
with Lifetime Warranty
- Highest quality available
- Reduces power consumption
- Reduces heat

48K Board (400) $240
32K Board (400/800) $100
FREE SHIPPING ANYWHERE IN U.S.A.
INTEC PERIPHERALS CORP
906 E. Highland Ave.
San Bernardino, CA 92404
(714) 881-1533
ATARI 400 800 are Trademarks of ATARI Inc
CIRCLE 180 ON READER SERVICE CARD



Get Serious About
ZX81
Computing
PROFESSIONAL KEYBOARD. Makes your ZX81 easier to use. Enter programs quickly and error-free. Plugs straight into your ZX81 without any soldering. Has 47 keys and a full space bar. $85.00
32K RAM. Expand the memory capacity of your ZX81 with this direct-plug-in module. Fully compatible with Sinclair's 16K RAM (to give your ZX81 system a full 48K). $99.95
64K RAM. Expand your ZX81 memory capacity to its maximum. Plugs in directly to your ZX81. $149.95
Software on Cassette
MULTIFILE PLUS.
Data storage system for 16K to 64K systems. Flexible, user-defined setup. Includes program tape, detailed instruction manual, 3 data tapes, storage case. $34.95
GAMES
MAZOGS A maze-adventure $9.95
INVADERS 10 levels of play $9.95
STAR TREK Zap the Klingons $9.95
DICTATOR Political adventure $14.95
Call (716) 874-5510 for Visa, MC Orders.
GLADSTONE Electronics
Mail order to 1585 Kenmore Ave., Buffalo N.Y. 14217
Checks or money orders. No CODs. Add shipping.
CIRCLE 171 ON READER SERVICE CARD

Maxell Floppy Disks
The Mini-Disks with maximum quality.

maxell
MH1
maxell
MD2

Dealer inquiries invited. C.O.D's accepted. Call FREE (800) 235-4137.

PACIFIC EXCHANGES
100 Foothill Blvd., San Luis
San Luis Obispo, CA 93401
In Cal. call (800) 592-5935 or (805)543-1037.
CIRCLE 233 ON READER SERVICE CARD

Animath

Jerry Wright and Lloyd Ollman, Jr.

The graphics potential of the Atari personal computer is a powerful educational tool. It can be used to transform the chores of learning into the fun of learning.

A growing number of companies now produce educational software for the Atari computer, but the quality of this software varies widely. A good children's educational program draws children to play with it, and allows learning to happen along with the fun.

When you think back to your school days (assuming you're not still there), what did you find to be the worst part of the learning process? For us it was drill and practice. Here's a children's educational program that makes addition practice enjoyable using an interesting type of animation.

The program is called Animath, for animated math program, and it uses a modified character set to create a sauntering gorilla. Player/missile graphics are also used to spice up the game.

There are several commercial programs which can be used to create modified character sets. Perhaps the best-known of these is *Fontedit*, from Iridis #2. We used a program similar to this to write a "gorilla" font to disk. The original version of this program called the font from disk and loaded it into memory. The Atari character set is a part of ROM, so the font must be moved to RAM, where it can be modified by the appropriate POKEs into memory.

We knew that many Atari owners utilize cassette storage, so we wrote a little utility to save the font as data statements at the end of the program. There are 24 modified characters, represented as 24 data statements. Because the characters are set up in 8 x 8 blocks, each of the eight numbers in the individual data statements is one 8-bit word, or byte.

After the gorilla is POKEd into RAM, he can be animated by the POSITION command. By changing the positions of his arms and legs, we simulate motion, and the gorilla is able to run down the screen to the first problem.

Thanks to Basic A+ from Optimized Systems Software, we were able to get an accurate list of variables. The first list we generated contained several variables we couldn't find. After listing the program to disk and entering it back in the computer, we came up with an accurate variable table, without all the variables that had been eliminated in earlier incarnations of the program. It's always wise to LIST, then ENTER programs when they are finished, to clear the Atari variable table of all but the variables actually being used.

Variable Table

NU$—String holding answer input by player
TN$—String holding randomly generated top number
BN$—String holding randomly generated bottom number
A$—String to hold player input to questions
P—Horizontal position of individual number input by player as an answer
START—Beginning location of character set in the operating system
NOW—Variable loop pointing to next character in the character set
CH—ATASCII number of character set
Q—Location of RAMTOP (PEEK (106))
I—Location of PLAYER/MISSILE Base Address
T—Variable for top end of volume in motion sounds
L—Number of problems completed
X—Horizontal position variable
WAL—Gorilla movement subroutine
PR—Number of problems chosen
W—Number of problems successfully completed
TN—Actual top number of problem
BN—Actual bottom number of problem
D—Decreasing pitch used in booming sound
E—Timing loop variable
A—Vertical position of gorilla or erase pattern
K—ATASCII number input from keyboard
N—Actual number input from keyboard
AMT—Answer: total of answer numbers in the ones, tens, and hundreds columns
J—Sum of top number (TN) and bottom number (BN)

Jerry Wright, 18812 116 Ave. SE, Renton, WA 98055.

THE NORMAL EXPECTATIONS OF SMALL BUSINESS

All too often our normal expectations for small business financial reporting are "logically abnormal". We limit our financial reporting activity to satisfying the needs of the IRS. Kept hidden in most financials is valuable information waiting to be found to assist us in managing our business more profitably. Our normal expectations dictate that the cost and difficulty of organizing and reporting such valuable information will prevent its access.

Likewise, most general ledger systems for the Apple II invariably restrict themselves to assisting us in satisfying the IRS . . . and not much more.

ACU=LEDGER, a newly introduced Financial Management System, represents a **dramatic departure from the "norm".**

ACU=LEDGER simultaneously addresses:

= **General Ledger Requirements** (IRS, etc.)
= **Product Profitability Analysis (Job Cost) (with automatic proration of 'overhead burden')**
= **Financial Budgeting, Forecasting, and Modeling**
= **Automatic Depreciation Scheduling/Posting** (including A.C.R.S.)
= **Instantaneous, upon demand** (on line) **inquiry**
= **Two Accounting Months "open" simultaneously**
= **Full Year's detail entries** retained on the current file

Moreover, **ACU=LEDGER** allows you to describe **your vision of your environment** (emphasizing Marketing, Operations, both, etc.). You can even describe your environment emphasizing one aspect, periodically re-organize to emphasize another, produce the management reports, and switch back to the original 'profile' — or stay with the new!

All of this is done within an integrated, logical universe (no costly redundant input for "Budget vs. Actual" Reporting, etc.). In fact, your bookkeepers' skills will improve because they use **ACU=LEDGER** (many bookkeepers' present difficulties are directly traceable to a problem in finding the "logical thread" that holds the current system together).

ACU=LEDGER'S logical structure is easily matched by its technical sophistication, viz.:

= **Produces many times more reports** than competitive systems (up to 289 unique P&L's, daily if you choose)
= **Stores many times more entries** than any competitive system
= **Has multiple techniques** for most functions (may use any or all of 4 methods to post entries)
= **Extremely efficient —** One test "closed" one day's 3,440 "entry-sides" in 2½ minutes!

ACU=LEDGER is so versatile that it can be operated in a very restrictive manner (minimal skill level); or it can be operated utilizing all of its advanced features (or anywhere in between). Migration from one level to another can be effected as you become familiar with **ACU=LEDGER**; and comfort can be taken in the recognition that as your needs change, **ACU=LEDGER** can change with you.

ACU=LEDGER™

for the
Apple II/Apple II Plus
DOS 3.3 (floppy disk)
48K RAM/Printer
Suggested Price $495.00

For more information, see your Apple Dealer or write:

THE
NATIONAL
SOFTWARE CO.
Chamber of Commerce Building
Suite 117
Baltimore, Md. 21202
(301) 539-0123

Distributed Exclusively by

EASTERN SOFTWARE DISTRIBUTORS INC.

Dealer Inquiries Welcome

ACU=LEDGER™ ACU=LEDGER™ ACU=LEDGER™

CIRCLE 223 ON READER SERVICE CARD

Apple II is a trademark of Apple Computer Inc.

Animath, continued...

C—Number of times gorilla goes through movement routine
B—Volume of motion sound routine ending in variable T, also wait routine
F—Flag set to 0: input character set. Flag set to 1: jump directly to main body of program
WT—Wait routine

The Program

Lines 0 through 4 introduce our authors, and set up our new character set. Line 2 DIMensions the various strings we will need, and makes sure that the string to hold the answer is empty.

In line 3 we find the top of our available memory by PEEKing RAMTOP, which is location (106) in memory. Then we fool the operating system into believing that the available memory is five pages smaller than it actually is, so we won't accidentally load our program on top of the changes we are going to make.

We then get an even number above our new RAMTOP (by adding 1) and multiply this number by 256. This new value of Q gives us the starting location of our new character set.

We use the number 256 because the Atari 6502 microprocessor divides memory into 256-byte "pages," and we must start the new character set at the beginning of an even page mark.

Line 4 begins the river sound and jumps to the introduction and instructions.

The subroutine at 6100 prints out the name of the program, and the authors. Then there is a pause at line 6120, so the title can be read, followed by a jump to the section asking for the number of problems desired—line 6000.

If this is the first time the program has been run, the F flag is set at 0 and a message asks the player to wait while the character set is set up. The program then returns to line 5.

The Atari character set can't actually be changed, because it is permanently embedded in ROM starting at address 57344. So we must move it into RAM. We do this in line 3 by PEEKing the character set and then POKEing it into the space we have set aside above RAMTOP.

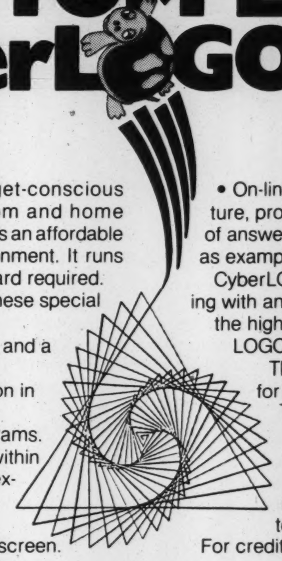
Line 6 reads the DATA defining the new characters and POKEs it into our new locations. In line 11 we POKE the location of our new character set into location (756), just above RAMTOP in the Character Base Register.

There is a stream in our graphics jungle. In line 8 we create this by turning on two Players and setting their location just below RAMTOP then POKEing this into the Player/Missile Base address 52479.

Jumping to line 15, the horizontal position of Player 0 is POKEd into 53248, Player 1 into 53249. POKEs (704) and (705) set the color, POKEs (53261) and

```
0 REM **ANIMATH BY LLOYD OLLMANN  AND JERRY WRIGHT (C)
1981 BY LJ SOFTWARE
2 DIM NU$(5),TN$(3),BN$(3),A$(1):NU$="     ":P=4:POKE 764,255
3 Q=PEEK(106):Q=Q-5:POKE 106,Q:Q=Q+1:Q=Q*256
4 SOUND 0,8,8,4:GOSUB 6100
5 START=57344:FOR NOW=0 TO 1023:CH=PEEK(START+NOW):POKE
Q+NOW,CH:NEXT NOW
6 FOR NOW=264 TO 463:READ CH:POKE Q+NOW,CH:NEXT NOW
8 I=PEEK(106)-8:POKE 54279,I
11 GRAPHICS 17:POKE 756,Q/256:SETCOLOR 4,1,2
12 T=20:SETCOLOR 2,0,0
15 POKE 53248,95:POKE 53249,127:POKE 704,117:POKE 705,117:
POKE 53261,255:POKE 53262,255:POKE 53256,3:POKE 53257,3
35 L=-1:X=1:WAL=500
40 POSITION X+1,2:? #6;"[AB]";:POSITION X+1,3:?
#6;"[CD]";:POSITION X+1,4:? #6;"[EF]";
55 TN$(2,2)=STR$(INT(RND(1)*10))
:BN$(2,2)=STR$(INT(RND(1)*10)):L=L+1:IF L=PR THEN GOTO 7000
56 POSITION 2,0:? #6;W;"/";L;
57 TN$(1,1)=STR$(INT(RND(1)*10))
:BN$(1,1)=STR$(INT(RND(1)*10))
58 TN=VAL(TN$):BN=VAL(BN$)
60 POSITION X+1,20:? #6;TN$;:POSITION X,21:?
#6;"+";BN$;:POSITION X,22:? #6;"___";
70 POSITION X,23:? #6;"   ";:GOSUB WAL
100 SOUND 0,8,8,4
120 IF RND(1)>0.95 THEN FOR D=10 TO 5 STEP -1:SOUND
1,D,10,INT(RND(1)*10):NEXT D:SOUND 1,0,0,0
140 GOSUB 600
180 IF RND(1)>0.95 THEN FOR D=10 TO 5 STEP -1:SOUND
1,D,10,8:NEXT D:SOUND 1,0,0,0
184 GOSUB 600
185 IF RND(1)>0.95 THEN FOR D=15 TO 0 STEP -1:SOUND
1,100,8,D:FOR E=1 TO 20:NEXT E:NEXT D:SOUND 1,0,0,0
195 GOSUB 600
200 GOTO 120
500 FOR A=2 TO 17
501 GOSUB 2000
535 NEXT A
```

NO TURTLE DRAWS THE BOTTOM LINE LIKE THE CyberLOGO TURTLE.



The CyberLOGO TURTLE is your budget-conscious LOGO choice. Designed for the classroom and home microcomputer user, the CyberLOGO TURTLE is an affordable open-ended, computer literacy learning environment. It runs on any Apple II, with only **48K!** No language card required.

The CyberLOGO TURTLE also provides these special features:

- Turtle graphics include colored backgrounds and a variety of pen colors.
- Sound increases student interest and attention in the learning process.
- A filing system saves both pictures and programs.
- Local variables enable the student to count within a program while global variables permit the exchange of information among programs.
- A full-screen editor allows users to write, review, and change a program on the whole screen.
- On-line "HELP", a unique CyberLOGO TURTLE feature, provides a user-friendly menu that offers a series of answers to questions about using the system as well as examples of programming.

CyberLOGO counts when it comes to continued learning with another Cybertronics International, Inc., product, the highly acclaimed "Karel the Robot," a bridge from LOGO to Pascal.

The CyberLOGO TURTLE learning environment, for the classroom and the home, includes the TURTLE Disk and a user manual priced at a budget-conscious **$99.95.**

To order the CyberLOGO TURTLE, send your check or money order to: Cybertronics International, Inc., 999 Mount Kemble Ave., Morristown, NJ, 07960.

For credit card orders, phone (212) 532-3089.

cii

cybertronics international, inc.

CIRCLE 152 ON READER SERVICE CARD

DATA PLOTTING SOFTWARE

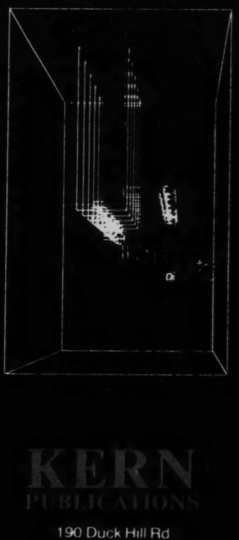
DATA PLOTTING ON MICROS — A collection of programs to process and display all types of data: bar charts, stock market charts, engineering and scientific data, 3D views of surfaces, pie charts, sorting, filtering, running averages, curve fitting, and more. Application to business, engineering and science. All program listings are in BASIC fully documented and keyed to theory. Use them as-is or modify for your own applications. This is one of the most complete collections of data plotting programs available anywhere — and the source code is fully documented!

Book - $24.95. **Disk** - $19.95.

ENGINEERING SOFTWARE

ENGINEERING SOFTWARE FOR MICROS — A self-teaching guide to developing software for engineering applications of microcomputers. Emphasis is on combining graphics with engineering problem solving. Programs included to interactively create engineering drawings, store on disk file, recall, modify and merge. Other programs for simulation, mechanisms design, heat transfer, circuit analysis, optimizations and including Monte Carlo techniques. Programs for Fourier analysis display frequency spectra graphically. This is a valuable collection of modern engineering analysis software for students and professionals.

Book - $28.50. **Disk** - $19.95.



KERN PUBLICATIONS

190 Duck Hill Rd
Duxbury, MA 02332

GRAPHIC SOFTWARE

GRAPHIC SOFTWARE FOR MICROCOMPUTERS — This self-teaching guide will show you how to write your own graphics software. 61 programs for 2D and 3D graphics: interactive input, translations, rotation, isometric views, perspective, scaling, stretching, clipping, surface intersections, shading, hidden line removal, tablet software, animation and more. Applications to science, engineering and business. All programs in BASIC fully documented. Modify and combine to suit your own applications. *"One of the most outstanding books on computer software" — A. Grund, U. Illinois. "The best book available on microcomputer graphics" — Creative Computing Feb. 1982*

Book - $21.95. **Disk** - $18.95.

STRUCTURAL ANALYSIS SOFTWARE

STRUCTURAL ANALYSIS ON MICROS — This self-teaching guide contains a series of programs which calculate stresses and deflections in beams, plates, trusses and frames using conventional and matrix techniques. Theory, equations and program listings fully documented. Written for the non-specialist who wants to use his micro for structural analysis with minimum investment in time. Use the programs as is or modify for your own applications.

Book - $39.95. **Disk** - $19.95.

Books contain fully documented program listings in BASIC with theory and equations. **Disks** contain the same programs as the books but without documentation. When ordering disks, please specify APPLE II Plus 48K DOS 3.3 or IBM. To order, send check drawn on U.S. bank money order in US funds, **Visa** or **Mastercard** number with expiration date to **KERN PUBLICATIONS** 190 Duck Hill Road, P.O. 1029A, Duxbury, MA 02332. Add $2 per book 4th cl postage in US and Canada, $3 1st cl or UPS in US, $4.50 1st cl Canada, $12 air Europe and Central America, $18 elsewhere. **Call (617) 934-0445 for faster delivery**

CIRCLE 306 ON READER SERVICE CARD

Animath, continued...

(53262) set up the shape and POKEs (53256) and (53257) set up Player size.

We keep track of the number of times the Gorilla finds a problem with the variable L, and use the variable X as the X coordinate of our gorilla's location. Atari Basic accepts names as well as line numbers in GOTOs and GOSUBs, so we give the movement subroutine a name, WAL.

Line 40 sets the starting location of the animal by using a position statement in X/Y coordinate form. Line 55 then randomly selects a top number which is placed in TN$ and a bottom number, placed in BN$.

Line 56 places the number of problems successfully answered next to the number of problems tried, and line 57 gets more numbers for the number strings. Line 58 gets the value of the strings and places them into variables TN and BN.

Line 60 places the numbers in their proper positions at the bottom of the screen.

In line 60 we jump to the gorilla animation section. This time WAL=500 so in line 500 we find the vertical positions for the gorilla in a FOR/NEXT loop and jump to the actual movement subroutine at line 2000.

Lines 2000 through 2009 draw the gorilla and move his arms and legs, while making the movement sound. Then the subroutine jumps back to line 501 where it gets a new position from the variable A in the FOR/NEXT loop. It then goes back to the movement routine until it reaches vertical position 17 on the screen. Next we jump back to line 100 for a sound routine and then jump to line 600.

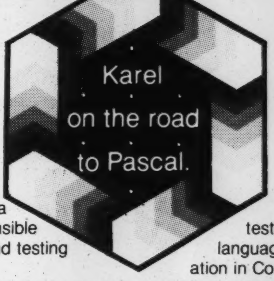
This is the keyboard routine—where we PEEK location (764) to find the internal code of the last key pressed. The computer runs through a series of IF/THEN statements to determine which key has been pressed by the player, and compares it to a list of valid inputs. The first number input goes into the ones column, the second into the tens column, the third into the hundreds column, and the fourth into the thousands column.

This is done by setting up a number holding string (NU$). The position of the number in the string is determined by line 700, which starts with P=4, so the first number is placed in the fourth position of NU$, the second number in the third position and so on. Line 705 prints the NU$ on the screen and then the Atari loops around to line 120 and back through the keyboard routine until Return is pressed at line 660.

Line 670 allows you to recover if a mistake is made. All you have to do is press Delete/Backspace or the Space Bar, the NU$ is cleared, and you start back at the ones column. You then repeat the

```
540 RETURN
600 TRAP 840:K=PEEK(764)
610 IF K=31 THEN N=1:GOTO 700
615 IF K=30 THEN N=2:GOTO 700
620 IF K=26 THEN N=3:GOTO 700
625 IF K=24 THEN N=4:GOTO 700
630 IF K=29 THEN N=5:GOTO 700
635 IF K=27 THEN N=6:GOTO 700
640 IF K=51 THEN N=7:GOTO 700
645 IF K=53 THEN N=8:GOTO 700
650 IF K=48 THEN N=9:GOTO 700
655 IF K=50 THEN N=0:GOTO 700
660 IF K=12 THEN AMT=VAL(NU$):GOTO 800
670 IF K=33 THEN NU$="     ":P=4:GOTO 705
690 RETURN
700 P=P-1:IF P<1 THEN K=33:GOTO 670
701 NU$(P,P)=STR$(N):POKE 764,255
705 POSITION X,23:? #6;NU$:RETURN
800 J=TN+BN
810 NU$="     ":P=4:POKE 764,255:POSITION X,23:? #6;NU$
820 POSITION X+1,2:? #6;"  ";:POSITION X+1,3:? #6;"
";:POSITION X+1,4:? #6;"  ";
830 POSITION X+1,8:? #6;"  ";:POSITION X,8+1:? #6;"
";:POSITION X,8+2:? #6;"   ";
835 IF AMT=J THEN WAL=500:W=W+1:GOTO 1000
840 POKE 764,255:X=8:WAL=900:GOSUB 1010:GOTO 4000
900 T=30:FOR A=2 TO 17:GOSUB 3000:NEXT A:T=20:RETURN
1000 IF X=8 THEN 5000
1005 X=1:T=10:A=17:FOR C=1 TO 20:GOSUB 2000:NEXT
C:T=20:FOR B=1 TO 200:NEXT B:GOSUB 1010:GOTO 55
1010 FOR A=17 TO 23:POSITION 0,A:? #6;"
";:NEXT A:RETURN
2000 POSITION X+1,A-1:? #6;"  ";
2005 POSITION X+1,A:? #6;"[NO]";:POSITION X+1,A+1:?
#6;"[PQ]";:POSITION X+1,A+2:? #6;"[RS]";
2006 FOR B=1 TO T:SOUND 3,200,8,B:NEXT B
2007 POSITION X+1,A:? #6;"[TU]";:POSITION X+1,A+1:?
#6;"[YV]";:POSITION X+1,A+2:? #6;"[WX]";
2008 FOR B=1 TO T:SOUND 3,200,8,B:NEXT B
2009 POSITION X+1,A:? #6;"[AB]";:POSITION X+1,A+1:?
#6;"[CD]";:POSITION X+1,A+2:? #6;"[EF]";:SOUND
3,0,0,0:RETURN
3000 POSITION X+1,A-1:? #6;"  ";
```

LEARN PASCAL WITH THE EXPERT. KAREL THE ROBOT.



"Performance...Excellent. Documentation... Excellent. Ease of Use...Excellent. Error Handling... Excellent"...stated Karel the Robot's April 26, '82 software review from **InfoWorld.*** InfoWorld also praised: "If it is possible for Pascal to become a household word, the Karel Simulator may be responsible ...the author has obviously spent years designing and testing his programming concepts."

Arthur Luehrmann, in his **Creative Computing** review, assured that "many educators will find Karel the Robot and its Simulator to be both entertaining and truly instructive."

The Karel Simulator, introduced by Cybertronics International, Inc., implements a Pascal programming/debugging environment that can be used by beginners, on any 64K Apple II with one disk drive. (IBM PC version coming soon!) Students learn structured programming techniques, using Richard E. Pattis's unique book, **Karel the Robot: A Gentle Introduction to the Art of Programming.** Two disks, with sample demonstrations of what Karel can do, and a concise user manual, enable students to program Karel to perform such tasks as escape mazes, run hurdle races, and collect "beepers." Two Course Disks provide all of the solutions to the problems in the book. They offer both a teacher-controlled computer literacy curriculum as well as a course suitable for self-instruction.

According to Dr. Phillip Miller, of the Development Committee for the **Advanced Placement** test in Computer Science, which designated Pascal the language for the high school Advanced Placement examination in Computer Science, " Karel the Robot is a tremendous contribution to teaching programming."

The U.S Air Force Academy, after adopting Karel for its Computer Science 100 course wrote: "Karel proved to be enormously successful...Karel lived up to all of the claims of the author and represents a powerful pedagogical tool."

And, Professor Michael Streibel, Instructional Systems, **Pennsylvania State University** agreed: "Karel is the best learning tool on the road to Pascal."

To order the complete Karel the Robot package, $242; additional Simulators, $85; additional Karel the Robot books, $7, send your check or money order, specifying 40 or 80 column versions to: Cybertronics International, Inc., 999 Mount Kemble Ave., Morristown, NJ 07960. For credit card orders, phone (212) 532-3089.

* © 1982 InfoWorld

cii

cybertronics international, inc.

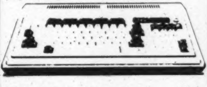
CIRCLE 153 ON READER SERVICE CARD

Our Name Means a Great Deal consumer computers

NEC

NEW! PC-6000

The serious fun machine for living, learning, working and playing. ***Please call for details.***



PC-8001A Microcomputer (32K)	CALL
PC-8031A Dual mini disk drives	CALL
PC-8012A I/O unit, 32K, 7 slots	489^{00}
NEC 8023 Printer	489^{00}
32K Memory Add on card	179^{00}
RenTec RS 232 card for NEC	155^{00}
RenTec Wedge Expansion w/32K	489^{00}

NEC SOFTWARE

NEC CP/M Operating System	125^{00}
General Accounting System	249^{00}
Accounts Receivable System	249^{00}
Inventory Control System	249^{00}
Payroll System	249^{00}
Job Cost System	249^{00}
Select Word Processing w/Speller	349^{00}
Report Manager	149^{00}
Games Pack 1 Alien, Space War	29^{00}
Games Pack 2 UFO Galaxian, Bomber	29^{00}
Wordstar by Micropro	299^{00}
Datastar by Micropro	249^{00}
Mailmerge for NEC Wordstar	109^{00}
Supersort by Micropro	169^{00}
Racet NECDOS	CALL

More software and accessories everyday.

NEW **SANYO** computer

Please call for details.

Best terminal prices on...

TeleVideo

ADDS

commodore

We are a full-line Commodore Dealer.

Please Call for More Information

FRANKLIN

FRANKLIN ACE 100 FEATURES

- Apple II Compatible
- 64K RAM User memory
- Upper and lower case
- Typewriter style keyboard
- Twelve key numeric pad
- Alpha lock shift key
- VisiCalc friendly
- 50 watt power supply
- Built in Fan

The Franklin ACE 100 is a professional personal computer that is hardware and software compatible with the Apple II and includes many features not found on the Apple unit. All programs written for the Apple II will run on the ACE 100 without modification including those using high and low resolution black and white graphics. The ACE 100 is plug compatible with Apple. All peripherals that operate in the Apple II will operate in the ACE 100 without modification.

IBM® COMPATIBLE ACCESSORIES

64K memory card by Microsoft	379^{00}
128K memory card by	CALL
192K memory card by	659^{00}
256K memory card by	799^{00}
Serial Async card with 2 ports	249^{00}
IBM Joysticks	55^{00}
IBM VisiCalc (Works up to 256K)	189^{00}
EasyWriter II Word Processor New!	279^{00}
Baby Blue Z 80 w 64K & CP/M	CALL

BASIS

The BASIS 108 microcomputer features include both a Z 80 and 6502 processor, RAM capacity of 128K, 80 columns, upper lower case, detachable keyboard, function keys, numeric keypad, and cursor block. It is completely compatible with all APPLE II hardware peripherals and software, along with being compatible with all CP/M based software.

Please call or write for more details.

16K RamBoard

FOR APPLE II

$50.00 KIT

ASSEMBLED & TESTED $69°°

APPLE II COMPATIBLE Accessories

Hayes Videx

Mountain Computer INCORPORATED

Prometheus VersaCard	219^{00}
CPS Multi Function card	169^{00}
Hayes Micromodem II	289^{00}
Hayes Smartmodem	245^{00}
Novation Apple Cat modem	319^{00}
Videx VideoTerm 80 column card	245^{00}
Z 80 SoftCard by Microsoft	289^{00}
16K RamCard by Microsoft	155^{00}
ThunderClock Calendar card	119^{00}
ALF 9 voice Music Card	149^{00}
Music System (16 voices) Mountain	299^{00}
Asynchronous Serial card by CCS	139^{00}
Grappler Printer Interfaces	139^{00}

μ-SCI

APPLE II COMPATIBLE DISK DRIVES

A2 with controller	469^{00}
A2-w/o controller	399^{00}
A40 with controller	479^{00}
A40 without controller	389^{00}
A70 with controller	599
A70 without controller	499^{00}

SOFTWARE

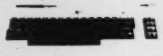
VisiCalc	185^{00}
VisiFile (Data Base Manager)	185^{00}
VisiTrend VisiPlot	199^{00}
VisiSchedule (New!)	239^{00}
VisiTerm	89^{00}
Tax Preparer by Howard Soft	119^{00}
Real Estate Analyzer by	119^{00}
PFS Personal Filing System	79^{00}
DB Master	165^{00}
Peachtree Accounting Software*	CALL
Continental Accounting Pkgs	199^{00}
WordStar by MicroPro*	199^{00}

Microsoft Software: we carry it all!

****Requires a Z 80 Soft Card***

VIC-20

The Friendly Computer



$244.50

VIC 1540 Single Disk Drive	469^{00}
Datasette Cassette I/O unit	65^{00}
Joystick Controller (pair)	20^{00}
VIC 1515 Graphic Printer	329^{00}
VIC Super Expander	54^{00}
8K Ram Cartridge	49^{00}
16K Ram Cartridge	99^{00}
VIC RS 232C Terminal interface	39^{00}
ViCalc Viable Calculator (T)	11^{00}
AMOK (C)	31^{00}
The Alien (8K T)	19^{00}

MONITORS

Amdek Video 300 12" Hi Res Green	169^{00}
Amdek Color I 13" Color w audio	379^{00}
Amdek Color II Hi Res RGB	769^{00}
Amdek Apple II DVM RGB card	169^{00}
NEC 12" Hi Res Green monitor	169^{00}
NEC 12" Composite Color	349^{00}
NEC 12" Hi Res RGB Color	799^{00}
Sanyo 9" Green monitor	179^{00}
Sanyo 12" B&W	189^{00}
Sanyo 13" Color Monitor	369^{00}
Zenith 12" Green monitor	119^{00}

ATARI®

PERSONAL COMPUTER

Atari 800 (16K)	679^{00}
Atari 800 w 32K 729^{00} w/48K	769^{00}
Atari 400 (16K)	329^{00}
Bit 3 80 Column Card for 800	299^{00}
410 Program Recorder	79^{00}
810 Disk Drive	439^{00}
850 Interface Module	169^{00}
Atari Joysticks (pair)	20^{00}
Axlon Ramcram 32K module	149^{00}
Atari 16K Module by Microtek	69^{00}
EDU PAKs Educational Tape Series	CALL
Pac Man (cartridge)	34^{95}
Centipede (cartridge)	34^{95}

We carry all ATARI software and hardware.

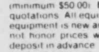
PRINTERS

C. Itoh F-10 40 CPS (parallel)	1399^{00}
C. Itoh F-10 40 CPS (serial)	1450^{00}
Epson MX 80 T Type III w/graph	CALL
Epson MX 80 F/T Type III w graph	CALL
Epson MX 82 F/T Type III w graph	CALL
IDS Prism 132 with color	1589^{00}
NEC Spinwriters (most models)	CALL
NEC 8032 Impact Dot Matrix	489^{00}
Okidata 82A w/tractor 80 col	469^{00}
Okidata 83A/s & 84A/s	CALL
Smith Corona Printer parallel	689^{00}

DISKETTES

Dysan 5¼" (Soft 10 or 16 sectored)	$10/39^{95}$
Verbatim 5¼" (Soft 10 or 16 sect.)	$10/29^{95}$
Scotch 3M 5¼" (Soft 10 or 16 sect.)	$10/26^{95}$
Same as above in quantity of 100	245^{00}
Scotch 3M Dr. Head Clean Kit (5¼" & 8")	29^{00}

Toll Free 800-854-6654



Info & California 714-698-8088

Ordering information: Phone orders using VISA, MASTERCARD, AMERICAN EXPRESS, CARTE BLANCHE and bank funds wire transfer. Send cashiers or certified check, money order or personal check (allow ten days to clear). Unless prepaid with cash please add 5% for shipping, handling & insurance (minimum $5.00). California residents add 6% sales tax. Foreign customers please add 10% shipping & export documentation (minimum $50.00). Educational Institutions and Corporations please send for written quotations. All equipment is subject to price change and availability without notice. All equipment is new and complete with manufacturer's warranty (usually 90 days). We will not honor prices which are typographical errors. C.O.D. orders require a 20% cash deposit in advance. If you are not completely satisfied, return product within 15 days for a refund (only with original container and unfilled warranty card — applies to hardware items only — no returns on software). All other returns subject to a restocking fee. Please call for more details.

Send order to: 8338 Center Drive, La Mesa, CA 92041

CIRCLE 146 ON READER SERVICE CARD

Animath, continued...

procedure until you have what you feel is the correct answer.

Pressing Return takes you out of the loop at line 660 where this time the value of the numbers in NU$ is transferred to the variable AMT. We then jump to 800 to find out if the answer is correct.

Line 810 clears NU$ and resets location (764) by POKEing in 255.

Lines 820 and 830 blank out the standing gorilla, then 835 determines if the answer is right. If it is, the gorilla walking routine (WAL) jumps back to line 500, adds 1 to the amount answered correctly, and jumps to line 1000.

If AMT doesn't equal J, then the gorilla movement subroutine is set to 900, the horizontal position (X) is moved over 8 places, and the gorilla runs through the subroutine at line 400 which forces him into the river. A reverse FOR/NEXT loop carries him downstream in subroutine 3000. Then the program jumps back to line 55 where the new value of X swims him upstream with the subroutine at line 900, and gives him a new addition problem to answer.

If the question was answered correctly, the program jumps to the subroutine at 2000 through 2009, where the gorilla jumps up and down with joy. The routine then sets the sound volume variable T to 20 and the horizontal position variable X to 1 and then jumps back to the main program loop at line 55.

When the number of problems chosen (PR) equals the number actually done (L), the program goes to line 7000 where it displays a score and offers a chance to play again.

We hope this program and accompanying explanation have given you an idea of some of the things that can be achieved with the Atari Personal Computer. We enjoy this system thoroughly, and hope that many more people will soon see the Atari as a computer with truly incredible possibilities.

Instructions

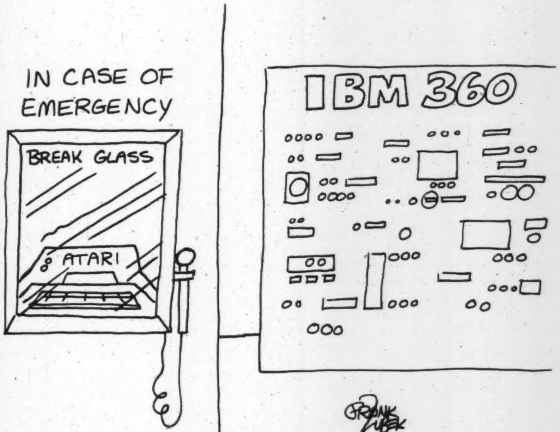
After the program is loaded and the player has chosen the number of problems, the gorilla will come on the screen and run down to the first problem. The answer should be typed in with the first number in the ones column, the second in the tens column, and the third in the hundreds.

If you make a mistake, just press the space bar. When you have the correct answer, press the return key. The gorilla will tell you if you are right.

In the listing that follows, several characters are in square brackets. These should be typed in as inverse characters. The Epson MX-80 prints a "]" instead of a clear sign, so when you see that symbol type Escape, then Control and Clear together. □

```
3001 POSITION X+1,A:? #6;"NO";:POSITION X+1,A+1:? #6;"PQ";
3002 FOR B=1 TO T:SOUND 3,170,8,B:NEXT B
3003 POSITION X+1,A:? #6;"TU";:POSITION X+1,A+1:? #6;"YV";
3004 FOR B=1 TO T:SOUND 3,170,8,B:NEXT B
3005 POSITION X+1,A:? #6;"AB";:POSITION X+1,A+1:?
#6;"CD";:SOUND 3,0,0,0:RETURN
4000 T=10:FOR A=17 TO 2 STEP -1:GOSUB 3000:POSITION
8,A+1:? #6;"   ";:NEXT A:T=20:GOTO 55
5000 GOSUB 1010:T=20:X=1:GOTO 55
6000 ? "}HOW MANY PROBLEMS WOULD YOU LIKE";:INPUT PR
6005 IF F=1 THEN 11
6010 ? "}JUST A MINUTE, WHILE I LET THE GORILLA
OUT OF HIS CAGE.":RETURN
6100 GRAPHICS 1:SETCOLOR 2,0,0:POSITION 6,4:?
#6;"[animath]":POKE 752,1:? "          A MATH PROGRAM BY"
6110 ? "   LLOYD OLLMANN AND JERRY WRIGHT":? "   CHARACTER
DESIGN   MIKE POTTER":POKE 752,1
6120 FOR WT=1 TO 1000:NEXT WT:? "}":GOSUB 6000:RETURN
7000 GRAPHICS 0:POKE 704,0:POKE 705,0:POKE 710,0
7010 ? "THIS TIME YOU GOT ";W;" OUT OF ";L:? "RIGHT.":?
"DO YOU WANT TO TRY AGAIN? (Y/N)":INPUT A$
7020 IF A$<>"Y" THEN END
7030 W=0:L=0:F=1:GOTO 6000
10000 DATA 0,0,0,0,1,3,6,52
10010 DATA 0,0,0,0,128,192,96,44
10020 DATA 124,254,255,239,239,231,231,199
10030 DATA 62,127,255,247,247,231,231,227
10040 DATA 71,83,115,6,6,4,2,14
10050 DATA 226,202,206,96,96,32,64,112
10060 DATA 255,255,255,255,255,255,255,255
10070 DATA 15,15,15,15,15,15,15,15
10080 DATA 240,240,240,240,240,240,240,240
10090 DATA 1,1,1,1,1,1,1,1
10100 DATA 128,128,128,128,128,128,128,128
10110 DATA 3,3,3,3,3,3,3,3
10120 DATA 192,192,192,192,192,192,192,192
10130 DATA 0,0,0,0,1,3,6,4
10140 DATA 0,0,0,0,128,198,110,63
10150 DATA 28,126,255,239,239,255,59,3
10160 DATA 63,127,255,227,227,227,231,238
10170 DATA 199,239,126,60,24,0,0,0
10180 DATA 224,224,112,48,48,60,60,0
10190 DATA 0,0,0,0,1,99,118,252
10200 DATA 0,0,0,0,128,192,96,32
```

```
10210 DATA 56,126,255,247,247,255,220,192
10220 DATA 7,7,14,12,12,124,124,0
10230 DATA 227,247,62,60,24,0,0,0
10240 DATA 252,254,255,199,199,199,231,119
20000 DATA 62,0,0,0,0,0,1,3
20010 DATA 6,52,0,0,0,0,128,192
20020 DATA 96,44,124,254,255,239,239,231
20030 DATA 231,199,62,127,255,247,247,231
20040 DATA 231,227,71,83,115,6,6,4
20050 DATA 2,14,226,202,206,96,96,32
20060 DATA 64,112,255,255,255,255,255,255
20070 DATA 255,255,15,15,15,15,15,15
20080 DATA 15,15,240,240,240,240,240,240
20090 DATA 240,240,1,1,1,1,1,1
20100 DATA 1,1,128,128,128,128,128,128
20110 DATA 128,128,3,3,3,3,3,3
20120 DATA 3,3,192,192,192,192,192,192
20130 DATA 192,192,0,0,0,0,1,3
20140 DATA 6,4,0,0,0,0,128,198
20150 DATA 110,63,28,126,255,239,239,255
20160 DATA 59,3,63,127,255,227,227,227
20170 DATA 231,238,199,239,126,60,24,0
20180 DATA 0,0,224,224,112,48,48,60
20190 DATA 60,0,0,0,0,0,1,99
20200 DATA 118,252,0,0,0,0,128,192
20210 DATA 96,32,56,126,255,247,247,255
20220 DATA 220,192,7,7,14,12,12,124
20230 DATA 124,0,227,247,62,60,24,0
20240 DATA 0,0,252,254,255,199,199,199
```



Software City's

INCREDIBLE SPECIAL

Star Blazer only $18.95
(retail $31.95)
OR
Bandits only $20.95
(retail $34.95)
with any other purchase

Of course we're just as proud of our regular prices. And if you don't see what you want here, please call us and ask for it, or write for our free catalog.

APPLE*

	Retail	Only
Screenwriter II (Superscribe II)	129.95	99.95
Ulysses HiRes #4	34.95	27.95
Castle Wolfenstein	29.95	23.95
Graphics Magician	59.95	47.95
Wizardry	49.95	39.95
Knight's of Diamonds	34.95	27.95
MasterType	39.95	31.95
Russki Duck	34.95	27.95
Time Zone Hi-Res #5	99.95	79.95
Snack Attack	29.95	23.95
Ceiling Zero	29.95	23.95
Track Attack	29.95	23.95
Borg	29.95	23.95
Cranston Manor Hi-Res #3	34.95	27.95
Zork I or Zork II	39.95	31.95
Apple Panic	29.95	23.95
Eliminator	24.95	19.95
Ultima	39.95	31.95
Ultima II	54.95	43.95
Atlantis	40.00	31.95
Deadline	49.95	39.95
Pinball (A2 PB1)	29.95	23.95
Mathemagic	89.95	71.95
Microwave	34.95	27.95
Electric Duet	29.95	23.95
Word Race	24.00	19.95

APPLE*

	Retail	Only
Kabul Spy	34.95	27.95
Swashbuckler	34.95	27.95
Minotaur	34.95	27.95
Dueling Digits	29.95	23.95
Home Accountant	74.95	59.95
PFS: Filing System	125.00	99.95
Wordstar (softcard)	375.00	299.95
General Manager (impr)	149.95	119.95
D.B. Master	229.00	179.95
VisiCalc 3.3	250.00	199.95
VisiFile	250.00	199.95
VisiSchedule	300.00	239.95
100's more...		

ATARI*

	Retail	Only
Raster Blaster	29.95	23.95
Star Trek 3.5	24.95	19.95
Ghost Hunter	34.95	27.95
Lots more...		

TRS-80 Model I/III*

	Retail	Only
Maxi Manager	99.95	79.95
Adventure 10,11, 12	39.95	31.95
Earthquake	20.95	16.95
Galactic Trilogy	39.95	31.95
Scarfman	19.95	15.95
Olympic Decathlon	29.95	23.95
Many more . . .		

To order, call us, toll free, at:

1-800-845-5147

Hours: Mon. thru Sat., 9-9
Our Guarantee: if it doesn't boot, we will replace it free...

VISA
MasterCard

We accept:
Visa or MasterCard
Checks (allow 2 weeks)
Money Orders
C.O.D.

Add $2.00 for shipping & handling and $3.00 extra if C.O.D. SC residents add 4% sales tax

*Apple is a trademark of Apple Computer Co
*TRS-80 is a trademark of Radio Shack
Atari is a trademark of Atari

Prices subject to change and Subject to availability

SOFTWARE CITY INC.

Software City, Inc
PO Box 12283
Columbia, South Carolina 29211
803 - 736-1683

TM

CIRCLE 267 ON READER SERVICE CARD

A Mortgage Amortization Program for the Atari

Marijane Green

I wrote the following program for the Atari 400 or 800 while learning the ins and outs of Basic. It uses a standard banking formula to compute the mortage payment due when given the amount of the loan, interest rate and time period. It also displays the payment number, loan balance, amount of payment applied to the principle and the amount of interest charged that month.

In addition, the total annual interest is displayed for each calendar year. If only the annual interest payments are wanted, the following changes will cause the printing of the monthly figures to be suppressed.

Delete lines 130 and 140

170 X=X-1:TMI=TMI+MI

180 ?“INTEREST FOR YEAR ”;Y; “IS”;TMI □

Marijane Green, 4801 N.E. 16 Ave., Ft. Lauderdale, FL 33334.

```
2 GRAPHICS 2:? #6;" MORTGAGE":? #6;"      AMORTIZATION":? #6;""
3 ? #6;" BY MARIJANE GREEN"                                  These instructions display a title on the screen.
5 FOR T=1 TO 5000:NEXT T:GRAPHICS 0
10 REM THIS IS A MORTGAGE PROGRAM
20 ?.:? "THIS PROGRAM WILL COMPUTE THE"          The instructions on lines 20 to 36 merely tell the user what the program will do.
21 ? "MONTHLY PAYMENT DUE, GIVEN THE"
22 ? "AMOUNT OF LOAN, INTEREST RATE"
23 ? "AND THE TIME PERIOD."
30 ? :? "IN ADDITION A LISTING BY MONTH"
31 ? "WILL GIVE THE LOAN BALANCE, THE"
32 ? "AMOUNT OF PAYMENT APPLIED TO THE"
33 ? "PRINCIPLE FOR THAT MONTH AND THE"
34 ? "AMOUNT OF INTEREST PAID THAT MONTH."
35 ? :? "THE ANNUAL INTEREST PAYMENT WILL"
36 ? "BE PRINTED":?
40 ? "AMOUNT OF LOAN IS ";:INPUT A                    Enter loan amount in dollars.
50 ? "RATE OF INTEREST IS ";:INPUT I                  Enter interest rate in %, i.e. 10,12.
60 ? "LENGTH OF TIME IN MONTHS IS ";:INPUT M         Enter number of months.
65 DIM F$(3):DIM MO$(3)                              Set up to accept a three-letter abbreviation for first month. See
70 ? "MONTH FIRST PAYMENT IS DUE IS ";:INPUT F$          DATA for spelling.
80 ? "YEAR FIRST PAYMENT IS DUE IS ";:INPUT Y          Enter year as 19xx, or 20xx.
90 FOR X=1 TO 12:READ MO$:IF MO$=F$ THEN 110         X=number of months loan held in first year.
100 NEXT X:? "CHECK SPELLING!":GOTO 70               Abbreviation for month not correct.
110 R=I/1200:V=(R+1)^M:P=(R*V*A)/(V-1)               See note at end.
120 P=INT(P*100+0.5)/100:? :? "MONTHLY PAYMENT IS ";P  Round payment to nearest cent and print.
130 ? "MONTH","BALANCE","AMOUNT APPLIEDTO"           Set headings.
140 ? " ","DUE","PRINC.","INTEREST"
150 FOR T=1 TO M:MI=A*R                              Start loop. Get monthly interest (MI).
160 MI=INT(MI*100+0.5)/100:S=P-MI:B=A-S:A=B          Round interest to nearest cent. Adjust values for display.
170 ? T,B,S,MI:X=X-1:TMI=TMI+MI                      Display table. Adjust X. Get total interest to date for this year.
172 IF X=0 THEN 180                                  Time to print yearly interest.
174 NEXT T
176 ? :? "INTEREST FOR YEAR ";Y;" IS ";TMI:END
180 ? :? :? "PAYMENT IS ";P:? "INTEREST FOR YEAR ";Y;" IS ";TMI:? :?     Print interest for last year.
190 X=12:Y=Y+1:TMI=0:GOTO 174                                            Reset.
200 DATA DEC,NOV,OCT,SEP,AUG,JUL,JUN,MAY,APR,MAR,FEB,JAN
```

NOTE: In line 110 the formula for computing the payment was taken from “How to Profit from Your Personal Computer” by T.G. Lewis, page 72. Payment=(iVA)/(V-1)where i=monthly interest rate in fraction form; A=amount of loan; M=length of loan in months; V=amount of interest on $1 when compounded by adding interest fees; V=(i=1)M.

H&E COMPUTRONICS INC.

• • EVERYTHING FOR YOUR TRS-80™ • ATARI™ • APPLE™ • PET™ • CP/M™ • XEROX™ • IBM™ • OSBORNE™ • •

* TRS-80 is a trademark of the Radio Shack Division of Tandy Corp. · * ATARI is a trademark of Atari Inc. · *APPLE is a trademark of Apple Corp. · * PET is a trademark of Commodore
* CP/M is a trademark of Digital Research · *XEROX is a trademark of Xerox Corp. · * IBM is a trademark of IBM Corp. · * OSBORNE is a trademark of Osborne Corp.

NEW

★ All orders processed within 24-Hours
★ 30-Day money back guarantee

BUSINESS PAC 100

100 Ready-To-Run Business Programs

**(ON CASSETTE OR DISKETTE).....Includes 128 Page Users Manual.....
Inventory Control.....Payroll.....Bookkeeping System.....Stock Calculations.....
Checkbook Maintenance.....Accounts Receivable.....Accounts Payable.....**

BUSINESS 100 PROGRAM LIST

NAME	DESCRIPTION
1 RULE78	Interest Apportionment by Rule of the 78's
2 ANNU1	Annuity computation program
3 DATE	Time between dates
4 DAYYEAR	Day of year a particular date falls on
5 LEASEINT	Interest rate on lease
6 BREAKEVN	Breakeven analysis
7 DEPRSL	Straightline depreciation
8 DEPRSY	Sum of the digits depreciation
9 DEPRDB	Declining balance depreciation
10 DEPRDDB	Double declining balance depreciation
11 TAXDEP	Cash flow vs. depreciation tables
12 CHECK2	Prints NEBS checks along with daily register
13 CHECKBK1	Checkbook maintenance program
14 MORTGAGE/A	Mortgage amortization table
15 MULTMON	Computes time needed for money to double, triple, etc.
16 SALVAGE	Determines salvage value of an investment
17 RRVARIN	Rate of return on investment with variable inflows
18 RRCONST	Rate of return on investment with constant inflows
19 EFFECT	Effective interest rate of a loan
20 FVAL	Future value of an investment (compound interest)
21 PVAL	Present value of a future amount
22 LOANPAY	Amount of payment on a loan
23 REGWITH	Equal withdrawals from investment to leave 0 over
24 SIMPDISK	Simple discount analysis
25 DATEVAL	Equivalent & nonequivalent dated values for oblig.
26 ANNUDEF	Present value of deferred annuities
27 MARKUP	% Markup analysis for items
28 SINKFUND	Sinking fund amortization program
29 BONDVAL	Value of a bond
30 DEPLETE	Depletion analysis
31 BLACKSH	Black Scholes options analysis
32 STOCVAL1	Expected return on stock via discounts dividends
33 WARVAL	Value of a warrant
34 BONDVAL2	Value of a bond
35 EPSEST	Estimate of future earnings per share for company
36 BETAALPH	Computes alpha and beta variables for stock
37 SHARPE1	Portfolio selection model-i.e. what stocks to hold
38 OPTWRITE	Option writing computations
39 RTVAL	Value of a right
40 EXPVAL	Expected value analysis
41 BAYES	Bayesian decisions
42 VALPRINF	Value of perfect information
43 VALADINF	Value of additional information
44 UTILITY	Derives utility function
45 SIMPLEX	Linear programming solution by simplex method
46 TRANS	Transportation method for linear programming
47 EOQ	Economic order quantity inventory model
48 QUEUE1	Single server queueing (waiting line) model
49 CVP	Cost-volume-profit analysis
50 CONDPROF	Conditional profit tables
51 OPTLOSS	Opportunity loss tables
52 FQUOQ	Fixed quantity economic order quantity model
53 FQEOWSH	As above but with shortages permitted
54 FQEOQPB	As above but with quantity price breaks
55 QUEUECB	Cost-benefit waiting line analysis
56 NCFANAL	Net cash-flow analysis for simple investment
57 PROFIND	Profitability index of a project
58 CAP1	Cap. Asset Pr. Model analysis of project
59 WACC	Weighted average cost of capital
60 COMPBAL	True rate on loan with compensating bal. required
61 DISCBAL	True rate on discounted loan
62 MERGANAL	Merger analysis computations
63 FINRAT	Financial ratios for a firm
64 NPV	Net present value of project
65 PRINDLAS	Laspeyres price index
66 PRINDPA	Paasche price index
67 SEASIND	Constructs seasonal quantity indices for company
68 TIMETR	Time series analysis linear trend
69 TIMEMOV	Time series analysis moving average trend
70 FUPRINF	Future price estimation with inflation
71 MAILPAC	Mailing list system
72 LETWRT	Letter writing system-links with MAILPAC
73 SORT3	Sorts list of names
74 LABEL1	Shipping label maker
75 LABEL2	Name label maker
76 BUSBUD	DOME business bookkeeping system
77 TIMECLCK	Computes weeks total hours from timeclock info.
78 ACCTPAY	In memory accounts payable system-storage permitted
79 INVOICE	Generate invoice on screen and print on printer
80 INVENT2	In memory inventory control system
81 TELDIR	Computerized telephone directory
82 TIMUSAN	Time use analysis
83 ASSIGN	Use of assignment algorithm for optimal job assign.
84 ACCTREC	In memory accounts receivable system-storage ok
85 TERMSPAY	Compares 3 methods of repayment of loans
86 PAYNET	Computes gross pay required for given net
87 SELLPR	Computes selling price for given after tax amount
88 ARBCOMP	Arbitrage computations
89 DEPRSF	Sinking fund depreciation
90 UPSZONE	Finds UPS zones from zip code
91 ENVELOPE	Types envelope including return address
92 AUTOEXP	Automobile expense analysis
93 INSFILE	Insurance policy file
94 PAYROLL2	In memory payroll system
95 DILANAL	Dilution analysis
96 LOANAFFD	Loan amount a borrower can afford
97 RENTPRCH	Purchase price for rental property
98 SALELEAS	Sale-leaseback analysis
99 RRCONVBD	Investor's rate of return on convertable bond
100 PORTVAL9	Stock market portfolio storage-valuation program

☐ TRS-80 Cassette Version	$99.95
☐ TRS-80 (Mod-I or III), Pet, Apple or Atari Versions	$99.95
☐ TRS-80 Mod-II, IBM, Osborne and CP/M Versions	$149.95

ADD $3.00 FOR SHIPPING IN UPS AREAS
ADD $4.00 FOR C.O.D. OR NON-UPS AREAS
ADD $5.00 TO CANADA AND MEXICO
ADD PROPER POSTAGE OUTSIDE OF U.S., CANADA AND MEXICO

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

H&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

AMERICAN EXPRESS · VISA · master charge

24 HOUR ORDER LINE
(914) 425-1535

ASK FOR OUR 64-PAGE CATALOG
DEALER INQUIRIES INVITED

ALL PRICES & SPECIFICATIONS SUBJECT TO CHANGE
DELIVERY SUBJECT TO AVAILABILITY

CIRCLE 136 ON READER SERVICE CARD

DOUBLE CROSS

Emily G. Johnston

Game programs are fine, but playing games with a computer wears a little thin after a while. How about a program that helps you create a game — a crossword puzzle, to be precise?

First, let me describe the puzzle. Most of you are familiar with a standard American crossword puzzle, in which words are inserted in a matrix diagram so that every letter is "keyed" — i.e., each letter is contained in two words. (English puzzles allow unkeyed letters, which makes them much harder.)

The kind of puzzle I am interested in is quite different — it's called a "double-crosstic" (D-C, for short). In these, the diagram is linear. Each square is numbered consecutively and words are formed along the line, not up and down. Each square has a letter code, which refers to a list of 'words,' and each 'word' has a definition. The puzzle-solver guesses the 'words' from their definitions and fills them into a set of dashes provided. Under each dash is a number which tells you where in the diagram the letter belongs.

When the puzzle is finished, the diagram will contain a quotation, and the initial letters of each 'word' will spell out the author's name and title of the work from which the quotation was taken.

For an example, look in the Sunday *New York Times Magazine* or in the back of any issue of *Saturday Review*. Many Sunday newspapers have them in their magazine supplements, also.

For some reason, these puzzles are rather addictive. I have been working them for years and have become rather expert at solving them (although not as expert as my father, who does them in ink!). Finally, I got the idea to try to make up some of my own.

To understand the creation of a D-C, we consider the problem in reverse. Choose a quotation. Write down the author's name and title of the source in a vertical list. Anagram the entire quote into a set of words beginning with those letters. Assign the cross-correspondence between letters in the words and letters in the quotation. Draw up the diagram and put all the numbers and code letters in. Think up some definitions for your words, and you are all done.

It's as much fun to make them up as to work them, but there are quite a few complications. It is very easy to miscount the letters. Generating the cross-correspondence is time-consuming and incredibly boring. Another problem is what I call the "end-game" — you get the whole thing almost done only to discover that you are left with two Q's, one R, three I's, and a Z. So, you return six or eight words to the letter pile and do it over. And over, and over. Finally, if you persevere, you will get a collection of decent words.

These puzzles are rather addictive. I have been working them for years and have become rather expert at solving them.

Professional puzzle-makers use Scrabble tiles to make up these puzzles. They get five or six sets, and put them into a box with 26 pigeonholes. (Go to a hardware store and try to find a box with 26 compartments in it.) Then they construct the quotation using the tiles and lay it out on the dining room table. The source letter box is put away and another box with 26 pigeonholes is used to collect the letters from the quote. Take out the letters for author-title and put them on the table. Start making up words, forming them with the tiles and putting them on the table.

About the time you are halfway through, the cat jumps on the table and scatters the tiles all over the room! The tiles solve the problem of miscounting or overlooking letters, but that's about all.

After making up a half-dozen or so, I decided that a computer program was definitely in order here. Besides eliminating the cat problem, it can keep a running count on all the letters, tell you when you have used a letter you do not have, compute the average number of letters per word required at any time, and — AND — do the cross-correspondence when you are finished.

There are probably all of four professional D-C puzzlemakers in the whole United States. They get maybe $50 per published puzzle, and have cornered what market there already is for them. Obviously, none of us are going to get rich off either the puzzles or the program. I wrote to the puzzlemakers I know of asking if there was an interest in such a program. I only got one reply, and he didn't know what the devil I was talking about.

Undaunted, I wrote the program anyway. It's called "DBLX," and it's so neat I have to share it with somebody. The puzzlemakers are too set in their ways to try our stuff, so here is a tool for you to try theirs.

DBLX is written in DEC PDP-11 Basic-Plus and is heavily dependent on the string manipulation features of that language. The code runs about 450 printed lines. The current version contains most of the bells and whistles, but there are a couple of limitations yet to be removed.

Emily Johnston, Director, Computer Center, Western Maryland College, Westminster, MD 21157.

The most severe limitation is that the input quotation can contain a maximum of 256 characters. This is due to the input buffering characteristics of Basic-Plus (and perhaps other Basics, too). This is not really long enough; although most quotations contain about that number of letters, the spaces between words and the punctuation need to be retained for readability, and for the cross-correspondence. There are a number of ways around this restriction, but none of them are attractive to a novice computer user.

Some improvements are also necessary. There is no mechanism yet for changing a word in the quotation in order to obtain one of the letters present in the author's name or title of the work. While this practice is not strictly kosher, it is sometimes done in order to use an interesting quote.

The cross-correspondence algorithm is not very smart either. One of the tacit rules of D-C's is that no two letters from the same 'word' should end up in the same word of the quote. One puzzle-maker to whom I showed the program pointed out that he likes to skip at least three words in the quotation between assignments and counts as words for this purpose things like standard phrases and hyphenated words. Although my algorithm makes a token effort to satisfy this, there are a number of violations.

Ultimately, I would like to add a graphics section which will produce the diagram and the list of blanks for the 'words.' That would eliminate the last piece of drudgery in what is otherwise a very entertaining pastime.

In the following scenario, the quotation has been entered from a file. It is possible to enter a complete word list via file also, so that the program essentially gets used just for creating the cross-correspondence. The program that generated this was run on a PDP-11/60 under RSTS/E. I have added a list of my definitions for the 'words' at the end, just for the fun of it. The example is from a puzzle I made up using tiles some time ago.

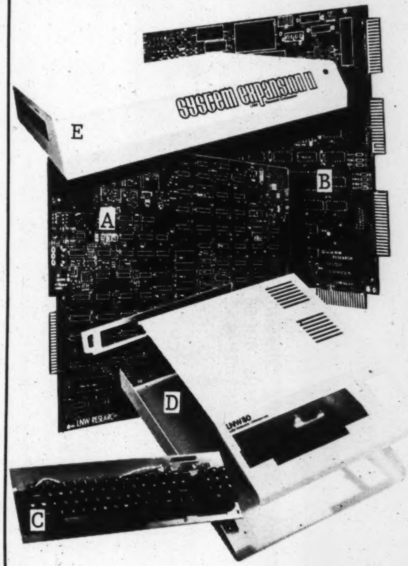
The puzzlemakers are too set in their ways to try our stuff, so here is a tool for you to try theirs.

If you would like to have a copy of the program, please send me a self-addressed, stamped envelope (large), and I will send you a listing. Or, if you have access to it, send a mag-tape (not cassette), format instructions, and enough postage for me to mail it back to you.

My definitions were:

A. Should you do these on bended knee? (2 words)
B. Proper compensation, some say. (4 words)
C. This is an odd number (comp.)
D. Bubbly.
E. Do this to your cat and you're in for big trouble. (4 words)
F. Traveling singing group, popular with country folk. (3 words)
G. NASA's newest bird. (2 words)
H. Penn's woods. (3 words)
I. Philippine city.
J. But it sounds like the opposite of straight-legged. (2 words)
K. Site of a college with the same name. (word & abbr.)
L. Looks OK, but you really can't tell.
M. Sounds from trains indicate they may use this to control the gears. (2 words)
N. Bubbly (again).
O. Something for nothing (colloq., 2 words)
P. No-good genuine shoe part. (2 words)
Q. You must ask this before taking any steps. (3 words)
R. Concurrently. (poetic; contr. & word) ☐

COMPUTER KITS – FROM $69.95



LNW SEMI-KITS can save you hundreds of dollars. By obtaining your own parts at the lowest possible cost and assembling the **LNW SEMI-KITS**, you can have the most highly acclaimed microcomputer in the industry – the **LNW80.** The **LNW SEMI-KITS** are affordable modules. You can start with a modest cassette system and expand to a full 4Mhz TRS-80 compatible system with 5 or 8 inch double density disks and color at any time.

A. LNW80 CPU – Made of high quality FR4 glass epoxy double sided circuit material, with plated-through holes and gold edge connector. It is fully solder-masked and silk screened. Here are just some of the outstanding features you will have when your **LLNW80** CPU board is fully assembled: • 16K RAM • Color and black and white video • 480 x 192 high resolution graphics • 64 and 80 column video • 4 Mhz Z80A CPU • Upper and lower case display • 500 and 1000 baud cassette I/O –**$89.95**

B. SYSTEM EXPANSION – Expand the **LNW80** computer board, **TRS-80** and **PMC-80** computer with the following features: • 32K memory • Serial RS232C and 20Ma port • Real time clock • Parallel printer port • 5 inch single density disk controller • Expansion bus (screen printer port) • Onboard power supply • Solder-masked and silk screened legend – **$69.95** (tin plated contacts) – **$84.95** (gold plated contacts)

C. KEYBOARD – 74 key expanded professional keyboard – includes 12 key numeric keypad. Fully assembled and tested. – **$99.95**

D. COMPUTER CASE – This stylish instrument-quality solid steel case and hardware kit gives your **LNW80** that professional factory-built appearance. – **$84.95** Add $12.00 for shipping.

E. SYSTEM EXPANSION CASE – This stylish instrument-quality solid steel case and hardware kit gives your **SYSTEM EXPANSION** interface that professional factory-built appearance. – **$59.95** Add $10.00 for shipping.

F. LNW80 CPU – HARD TO FIND PARTS KIT – **$82.00**
G. LNW80 VIDEO – HARD TO FIND PARTS KIT – **$31.00**
H. SYSTEM EXPANSION – HARD TO FIND PARTS KIT – **$27.50**
I. LEVEL II ROM set. (6 chip set) – **$120.00**

VISA and **MasterCard** accepted. Add $3.00 for shipping plus $1.00 for each additional item. All shipments via UPS surface. Add $2.00 for U.S. Mail. Shipments outside continental U.S.: funds must be U.S. dollars. Sufficient shipping costs must be included with payment.

ORDERS & INFORMATION – (714) 544-5744
SERVICE – (714) 641-8850

LNW Research Corp.
2620 WALNUT Tustin, CA. 92680

CIRCLE 195 ON READER SERVICE CARD

```
RUN DBLX
DOUBLE-CROSSTIC -- VER 1.1

DO YOU WANT INSTRUCTIONS? YES
 ** DBLX ('DOUBLE-CROSS') INSTRUCTIONS **

DBLX HAS THREE PHASES: 1- QUOTE ENTRY AND INITIALIZATION,
2- WORD ENTRY, 3- CROSS-CORRESPONDENCE ASSIGNMENT.
PHASE 1: IN RESPONSE TO THE PROMPT, TYPE IN YOUR QUOTE.
         A MAXIMUM OF 256 CHARACTERS COUNTING ALL SPACES AND
         PUNCTUATION IS ALLOWED.  SPACES AND PUNCTUATION ARE
         NOT REQUIRED.  HOWEVER, PHASE 3 USES THE SPACES TO
         DECIDE HOW TO ASSIGN THE CORRESPONDENCES.  IF YOU
         WANT TO SKIP 2 WORDS BETWEEN ASSIGNMENTS, FOR EXAMPLE,
         YOU SHOULD ENTER A SPACE EVERY THIRD WORD IN YOUR
         QUOTE.  IF YOU ARE FAMILIAR WITH THE COMPUTER SYSTEM,
         YOU MAY CONSTRUCT A FILE CONTAINING YOUR QUOTE USING
         ANY OF THE AVAILABLE EDITORS.  THEN, WHEN ASKED FOR
         THE QUOTE BY DBLX, ANSWER '@FILENM.EXT', WHERE
         FILENM.EXT IS THE NAME OF YOUR FILE.

         DBLX WILL ASK NEXT FOR THE AUTHOR'S NAME AND THE
         TITLE OF THE WORK, WHICH FORM THE INITIAL LETTERS FOR
         THE WORDS YOU MUST CONSTRUCT.  IF YOU WANT ONLY ONE OR
         THE OTHER, ENTER IT IN RESPONSE TO THE 'AUTHOR' PROMPT.
         A MAXIMUM OF 30 LETTERS IS ALLOWED.  THESE NAMES MUST BE
         ENTERED IN SINGLE QUOTES IF THERE ARE ANY EMBEDDED SPACES
         CONTAINED IN THEM.  SPACES ARE NOT REQUIRED.

AFTER THE QUOTE AND AUTHOR/TITLE HAVE BEEN ENTERED, THE PROGRAM
WILL PRINT SOME PRELIMINARY STATISTICS AND THEN ENTER PHASE 2,
THE WORD-ENTRY MODE.

PHASE 2: ENTER THE WORDS FOR THE PUZZLE, OR EXECUTE
         VARIOUS DBLX COMMANDS.  FOR A LIST OF THE COMMANDS,
         TYPE THE COMMAND '*HELP' ONCE YOU ARE IN THIS PHASE.
         ALL COMMANDS ARE PREFACED BY '*' TO DISTINGUISH THEM
         FROM THE WORDS.  DBLX WILL TELL YOU IF YOU ARE OUT OF
         ANY LETTER, IF THERE IS NO INITIAL LETTER FOR THE WORD,
         OR IF THE WORDLIST IS FULL.  THE '*CHANGE' COMMAND
         ALLOWS YOU TO DELETE WORDS AT ANY TIME.

PHASE 3: WHEN THE WORDLIST IS FULL AND ALL LETTERS HAVE BEEN
         USED, YOU ARE READY TO HAVE THE CROSS-CORRESPONDENCE
         COMPUTED.  THERE IS NO DIALOG.  WHEN YOU GET THE NEXT
         PROMPT, TYPE THE COMMAND '*PRINT' FOR THE RESULTS.
         IN RESPONSE TO THE QUESTION 'WHERE?', ANSWER EITHER
         'KB' FOR YOUR TERMINAL, OR WITH A FILE NAME.

END INSTRUCTIONS
ENTER QUOTATION - END WITH 'CR' (MAX 256 CHARS)
? @QUOTE2.TXT
QUOTATION IS:

I DO NOT BELIEVE THAT FRIENDS ARE NECESSARILY THE PEOPLE YOU LIKE
BEST, THEY ARE MERELY THE PEOPLE WHO GOT THERE FIRST. YOU ARE
STUCK WITH MOST OF THEM FOR LIFE, OFTEN WITH PEOPLE WHO ARE
ENTIRELY REPREHENSIBLE, UNRELIABLE, AND EVEN SPITEFUL.

ENTER AUTHOR'S NAME? 'PETER USTINOV'
```

```
ENTER TITLE OF WORK? 'DEAR ME'
   LETTERBANK:
TOTAL REMAINING LETTERS:  177
A -  7    F - 7    K -  2    P -  7    U -  4
B -  4    G - 1    L - 13    Q -  0    V -  1
C -  2    H - 11   M -  2    R - 12    W -  4
D -  2    I - 12   N -  8    S -  8    X -  0
E - 35    J - 0    O - 13    T - 16    Y -  6
                                       Z -  0
PRELIMINARY STATISTICS:

 # LETTERS IN QUOTE: 195  # LETTERS IN A/T: 18
AVERAGE # LETTERS PER WORD REQUIRED: 10
INITIAL FREQUENCY DISTRIBUTION:
ENGLISH: E T A O N I H S R D L U M C F Y W G P B V K X Q J Z

QUOTE:   E T L O I R H N S A F P Y B U W C D K M G V

END INITIALIZATION PHASE
** WORD ENTRY MODE **

? PROPOSAL EFFORTS

? RUB THE WRONG WAY

? SPACE SHUTTLE

? OBERLIN OH

? VERISIMILITUDE

? *WORDLIST

  PROPOSAL EFFORTS              N
  E                             OBERLIN OH
  T                             VERISIMILITUDE
  E                             D
  RUB THE WRONG WAY             E
  U                             A
  SPACE SHUTTLE                 R
  T                             M
  I                             E

? *HELP

 AVAILABLE COMMANDS ARE:
   *EXPAND   --- EXPAND LETTERBANK
   *HELP     --- PRINT THIS MESSAGE
   *STATISTICS  ---DISPLAY VARIOUS STATISTICS
   *QUIT     --- TERMINATE PROGRAM
   *LETTERBANK  --- DISPLAY LETTERBANK
   *WORDLIST    --- DISPLAY WORDLIST
   *ASSIGN    --- COMPUTE CROSS CORRESPONDENCE
```

THE VOICE OF THE FUTURE . . . HEAR TODAY

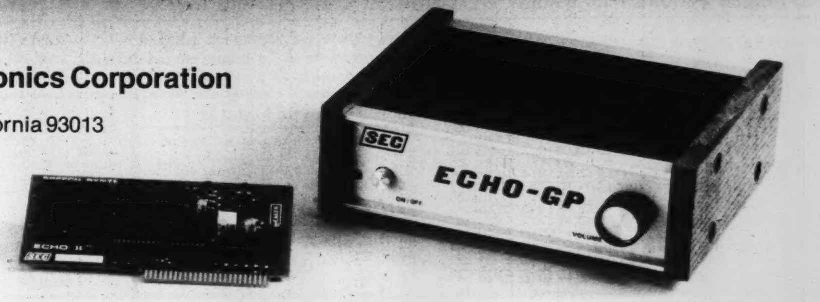
Echo Speech Synthesizers

Now your computer can talk with an ECHO™ speech synthesizer from Street Electronics! Our SPEAKEASY™ phoneme system provides unlimited vocabulary while using a minimum of memory. The TEXTALKER™ text-to-speech firmware allows you to simply type in a word or phrase and let the computer do the rest. With nearly 400 grammatical rules contained in the system, your computer can properly pronounce most correctly spelled words. Simple commands allow you to select from:

- Entire words pronounced or spelled letter by letter
- Different volumes
- Spoken punctuation if desired
- 63 different pitch levels
- Words spoken monotonically or with intonation
- Fast or slow speech output

The applications of the ECHO speech synthesizer are virtually unlimited, ranging from business and education to games to aiding the handicapped. The ECHO][which plugs into the Apple][is priced at **$199.95.** The ECHO-GP is a complete stand alone unit which is compatible with most any computer; it sells for **$369.95.**

Street Electronics Corporation
1140 Mark
Carpinteria, California 93013
(805) 684-4593



CIRCLE 282 ON READER SERVICE CARD

INTRODUCING THE THIRD GENERATION OF INVESTORS' SOFTWARE FOR THE APPLE.™

THE INVESTOR'S TOOLKIT™

More complete than any other. Easier to use than any other. And you pay only for the systems you need. You can later "upgrade" any program package for just the price difference.

PROGRAM PACKAGES

(consisting of the programs as numbered below)

Chart Trader (contains #1, 4)	**$149.00**
Market Analyst (contains #1, 4, 15, 16)	**249.00**
Financial Trader (contains #1, 4, 5, 6, 9, 15, 16, 17, 18)	**499.00**
Professional Trader (contains #1, 3, 4, 5, 6, 8, 9, 12, 14, 15, 16, 17, 18)	**699.00**

Chart Trader and Market Analyst also available with Graphic Charting with Analysis II (#5) for $50.00 additional. Packages listed above may be upgraded for price difference only.

DATA MANIPULATION

1. Data File Management	**$ 99.95**
2. V-Comm	**99.95**

TECHNICAL ANALYSIS TOOLS

3. Advanced Graphics One	**$199.95**
4. Graphic Charting with Analysis	**99.95**
5. Graphic Charting with Analysis II	**149.95**
6. Gann Square of Nine	**49.95**
7. Swing Wave Day Counter	**49.95**
8. Fibonacci Projection	**59.95**

TRADING SYSTEMS WITH OPTIMIZATION

9. Moving Average Crossover	**$149.95**
10. Engineers System	**199.95**
11. Parabolic System	**99.95**
12. Directional Movement System	**99.95**
13. Swing Index System	**99.95**
14. Relative Strength Index System	**99.95**

TRADING SYSTEMS

15. Wilders 6 Systems	**$129.95**
16. Relative Strength Index Trading System	**49.95**
17. Engineers System	**69.95**
18. Colver Method	**39.95**
19. Trend Master	**99.95**
20. CSR 1: Moving Average with % Price Band	**79.95**
21. CSR 2: Directional Indicator	**79.95**
22. CSR 3: L-S-O Price Channel	**79.95**
23. CSR 4: Range Quotient System	**79.95**
24. CSR 5: M-II Price Channel	**79.95**
25. CSR 6: Dual Moving Average	**79.95**
26. CSR 7: The Outside Price Channel	**79.95**
27. CSR 8: Reference Deviation System	**79.95**
28. CSR 9: Trend-Countertrend Hybrid	**79.95**
29. CSR 10: High-Low Moving Average Breakout	**79.95**

Send $5 (credited to your first purchase) for a demonstration disk (if you don't have an Apple, any dealer will run it for you). Mastercard and Visa holders order toll-free, 1-800-835-2246. *(Demo not available through 800 number.)*

OMEGA MICROWARE, INC.™
222 SO. RIVERSIDE PLAZA
CHICAGO, IL 60606
312-648-1904

Software by
Orion Management, Inc.

© 1982 Omega MicroWare, Inc.

Apple is a registered trademark
of Apple Computer, Inc

CIRCLE 228 ON READER SERVICE CARD

```
  *PRINT    --- PRINT WORDLIST AND DIAGRAM W/CORRESPONDENCES
  *CHANGE   ---DELETE WORDS FROM WORDLIST
 NOTE: THE FIRST TWO LETTERS OF THE COMMANDS MAY BE USED

? EYE FOR AN EYE

? THIRTYTHREE

? EFFERVESCENT

? EBULLIENT

? EEN WHILE

? *WO

  PROPOSAL EFFORTS             N
  EYE FOR AN EYE               OBERLIN OH
  THIRTYTHREE                  VERISIMILITUDE
  EFFERVESCENT                 D
  RUB THE WRONG WAY            EBULLIENT
  U                            A
  SPACE SHUTTLE                R
  T                            M
  I                            EEN WHILE

? *STAT
 # LETTERS REMAINING:  72
 # WORDLIST OPENINGS:  8
 AVERAGE # LETTERS/WORD NEEDED:  9

CURRENT FREQUENCY DISTRIBUTION:

ENGLISH: E T A O N I H S R D L U M C F Y W G P B V K X Q J Z

QUOTE:   E T O L H P I R S A N F Y K B W D M


? UP WITH PEOPLE

? THE KEYSTONE STATE

? NOT KNEED

? PLEASE
NO START LETTER FOR THIS WORD - WORD DELETED

? ASK
LETTERBANK HAS NO K WORD ASK DELETED

? *LETTERBANK
  .LETTERBANK:
TOTAL REMAINING LETTERS:  39
A - 2    F - 2    K - 0    P - 2    U - 0
B - 1    G - 0    L - 5    Q - 0    V - 0
C - 0    H - 3    M - 1    R - 3    W - 0
D - 0    I - 3    N - 0    S - 1    X - 0
E - 9    J - 0    O - 4    T - 2    Y - 1
                                    Z - 0
```

```
? *EXPAND
AA B   EEEEEEEEE FF  HHH III   LLLLL M  OOOO PP  RRR S TT      Y
? DOPPLER SHIFT

? A FREEBEE

? REAL HEEL

? *EX
A    E   H II   LL M  OOO   R  T     Y
? *WO
  PROPOSAL EFFORTS            NOT KNEED
  EYE FOR AN EYE              OBERLIN OH
  THIRTYTHREE                 VERISIMILITUDE
  EFFERVESCENT                DOPPLER SHIFT
  RUB THE WRONG WAY           EBULLIENT
  UP WITH PEOPLE              A FREEBEE
  SPACE SHUTTLE               REAL HEEL
  THE KEYSTONE STATE          M
  I                           EEN WHILE

 ? MOTHER MAY I

 ? ILOILO
 WORDLIST FULL

 ? *CHANGE
 AFTER THE PROMPT 'WORD?' ENTER THE WORD TO BE DELETED
 WHEN FINISHED, ANSWER WITH <CR>
 WORD? THIRTYTHREE
 WORD?

 ? *EX
     EE   HH I          RR  TT      Y
 ? *WO

   PROPOSAL EFFORTS           NOT KNEED
   EYE FOR AN EYE             OBERLIN OH
   T                          VERISIMILITUDE
   EFFERVESCENT               DOPPLER SHIFT
   RUB THE WRONG WAY          EBULLIENT
   UP WITH PEOPLE             A FREEBEE
   SPACE SHUTTLE              REAL HEEL
   THE KEYSTONE STATE         MOTHER MAY I
   ILOILO                     EEN WHILE

 ? THIRTYTHREE
 WORDLIST FULL

 ? *ASSIGN

 ? *PRINT
 WHERE? PUZZL2.OUT
 ** OUTPUT TO PUZZL2.OUT COMPLETE

 ? *PRINT
 WHERE? KB:
```

Experience the Magazines of the Future . . . TODAY

MAGATARI™
for the Atari 400/800

TRC™
for the TRS-80 COLOR, Ext. Basic

appletree™
for the APPLE II+

The Programmer's Institute's magnetic magazines will entertain, educate, and challenge you. Each issue features ready-to-load programs ranging from games, adventures, home applications, and utilities to personal finance, educational, and our "unique" teaching programs. Our magazines include fully listable programs, a newsletter containing descriptions and instructions for all programs, and notes on programming techniques used. Magatari and TRC are available on cassette or diskette. Appletree is available on diskette only.

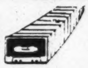
Subscription price for cassette is $50 per year, $30 per ½ year and $10 for a trial issue.
For diskette $75 per year, $45 per ½ year and $15 for a trial issue. . . . Don't miss another issue!

"Received my first copy . . . it's great! Please rush to me one of each back issue, so I'll have a complete set." **R.G., Chicago, IL**

"Not only are the games fun and the applications useful, but the quality of the programs is excellent." **S.P., Midwest Computer Software Sales**

"(Your magazine) is everything I expected and more!" **P.L., Durand, MI**

the programmer's program



The Programmer's Institute has designed a series of programs which examine the innovative use of BASIC commands. By exploring the fundamentals of computer programming, **The Programmer's Program** provides a valuable supplement to the BASIC manual.

Each technique is explained in depth, then graphically displayed, enabling you to gain a better understanding of programming concepts. Such methods as **multiple loops**, **stacks**, **queues**, **graphics**, **game programming**, **sorts**, **trees**, **boolean logic**, **and memory savers** are explored, making programming tasks easier and more efficient.

The Programmer's Program is ideal for anyone who has ever been frustrated by the manuals! **($50 cassette, $55 diskette).**

FREE OFFER!

Order both The Programmer's Program and 1 year's subscription, and the total cost is only $75 cassette, $100 diskette. You will receive our **Haunted House Adventure** (14.95) ABSOLUTELY FREE with any $75 order. Offer expires September 30, 1982.

FREE CATALOG UPON REQUEST
Dealer Inquiries Invited
ALL SOFTWARE REQUIRES 16K

PROGRAMMER'S INSTITUTE

PI®
a division of FUTUREHOUSE
P.O. BOX 3191, DEPT. 1-A
CHAPEL HILL, NC 27514
MasterCard/VISA Welcome
10 AM - 9 PM, Mon - Sat
See your local dealer or order direct
1-919-489-2198
Add $2 postage and handling to all orders.

CIRCLE 245 ON READER SERVICE CARD

SOFTWARE STREET

CALL OR WRITE FOR A FREE PRICE LIST.

SOFTWARE STREET
3392 Clipper Drive
Chino, CA 91710
(714) 591-3061

2.50 min. shipping

PAC-MAN	32.95
CENTIPEDE	32.95
CAVERNS OF MARS	29.00
STAR RAIDERS	32.95
ASTEROIDS	28.00
MICROSOFT BASIC	75.95
MACRO ASSEMBLER	76.50
ENTERTAINER	79.00
MICROTEK 32K BOARDS	99.00
BOOKKEEPER KIT	189.00
BOOKKEEPER	115.00
ATARI SPEED READING	59.00
MY FIRST ALPHABET	27.95
CANYON CLIMBERS	21.21 (C) 25.46 (D)
CRANSTON MANOR	24.95
DEADLINE	39.00
AXIOM 80 COLUMN IMPACT PRINTER	299.00
PACIFIC COAST HIGHWAY	21.21 (C) 25.46 (D)
ZORK I & II	33.96 ea.
MISSILE COMMAND	28.00
K-RAZY SHOOTOUT	34.95
K—STAR PATROL	34.95
K-RAZY KRITTERS	34.95
K-RAZY ANTIKS	34.95
THRESHOLD	29.95
400	269.00
800	639.00
810	429.00
BLANK DISKS (10)	24.95
AXIOM IMP4QAA180 COLUMN IMPACT	499.00

PRICES ARE SUBJECT TO CHANGE.
ABOVE ARE PREPAID PRICES.

MasterCard VISA

WE ALSO CARRY PERCOM SYSTEMS AND MUCH MORE!

ATARI

ATARI IS A REGISTERED TRADEMARK.

CIRCLE 269 ON READER SERVICE CARD

```
WORDLIST:

A.   P   R   O   P   O   S   A   L   E   F   F   O   R   T   S          J.   N   O   T   K   N   E   E   D
     42  64  77  138 146 166 177 195 192 193 18  44  68  72  95              182 5   17  107 187 11  21  183

B.   E   Y   E   F   O   R   A   N   E   Y   E                          K.   O   B   E   R   L   I   N   O   H
     102 157 159 92  98  101 147 151 162 38  41                              85  168 180 19  46  52  4   116 119

C.   T   H   I   R   T   Y   T   H   R   E   E                          L.   V   E   R   I   S   I   M   I   L   I   T   U   D   E
     58  60  93  124 131 48  59  73  90  120 128                             12  27  35  126 57  135 66  167 179 190 6   50  2   13

D.   E   F   F   E   R   V   E   S   C   E   N   T                      M.   D   O   P   P   L   E   R   S   H   I   F   T
     132 117 122 139 148 185 8   24  30  43  133 136                         23  129 75  78  156 164 173 114 137 176 127 87

E.   R   U   B   T   H   E   W   R   O   N   G   W   A   Y              N.   E   B   U   L   L   I   E   N   T
     154 171 7   14  40  47  81  94  113 165 84  108 181 62                  150 178 194 9   51  1   29  22  96

F.   U   P   W   I   T   H   P   E   O   P   L   E                      O.   A   F   R   E   E   B   E   E
     99  141 144 153 191 15  45  54  83  160 175 184                         100 130 158 31  61  55  65  67

G.   S   P   A   C   E   S   H   U   T   T   L   E                      P.   R   E   A   L   H   E   E   L
     188 189 16  106 143 32  82  105 110 115 125 149                         161 69  25  70  88  155 170 79

H.   T   H   E   K   E   Y   S   T   O   N   E   S   T   A   T   E      Q.   M   O   T   H   E   R   M   A   Y   I
     152 163 174 53  56  71  103 118 123 172 186 33  39  63  86  89          112 140 104 111 74  26  121 34  97  20

I.   I   L   O   I   L   O                                              R.   E   E   N   W   H   I   L   E
     109 142 3   10  37  49                                                  76  91  28  134 145 36  169 80

TYPE 'CR' WHEN READY FOR DIAGRAM?

DIAGRAM CORRESPONDENCE:
 1 ,N   2 ,L  3 ,I   4 ,K  5 ,J  6 ,L   7 ,E  8 ,D  9 ,N  10 ,I  11 ,J  12 ,L  13 ,L   14 ,E  15 ,F  16 ,G  17 ,J   18 ,A
 19 ,K  20 ,Q  21 ,J  22 ,N  23 ,M  24 ,D   25 ,P  26 ,Q  27 ,L   28 ,R  29 ,N  30 ,D  31 ,O  32 ,G  33 ,H  34 ,Q  35 ,L  36 ,R
 37 ,I  38 ,B   39 ,H  40 ,E  41 ,B   42 ,A  43 ,D  44 ,A  45 ,F  46 ,K  47 ,E   48 ,C  49 ,I  50 ,L   51 ,N  52 ,K  53 ,H
 54 ,F   55 ,O  56 ,H  57 ,L  58 ,C   59 ,C  60 ,C  61 ,O  62 ,E   63 ,H  64 ,A  65 ,O   66 ,L  67 ,O  68 ,A  69 ,P  70 ,P
 71 ,H   72 ,A  73 ,C  74 ,Q   75 ,M  76 ,R  77 ,A  78 ,M  79 ,P  80 ,R   81 ,E  82 ,G  83 ,F   84 ,E  85 ,K  86 ,H   87 ,M
 88 ,P  89 ,H  90 ,C  91 ,R   92 ,B  93 ,C  94 ,E  95 ,A  96 ,N   97 ,Q  98 ,B  99 ,F   100 ,O  101 ,B  102 ,B   103 ,H  104 ,Q
 105 ,G  106 ,G  107 ,J   108 ,E  109 ,I  110 ,G  111 ,Q   112 ,Q  113 ,E  114 ,M  115 ,G   116 ,K  117 ,D   118 ,H  119 ,K
 120 ,C  121 ,Q   122 ,D  123 ,H  124 ,C   125 ,G  126 ,L  127 ,M  128 ,C   129 ,M  130 ,O  131 ,C  132 ,D  133 ,D   134 ,R
 135 ,L  136 ,D  137 ,M   138 ,A  139 ,D  140 ,Q  141 ,F  142 ,I  143 ,G   144 ,F  145 ,R  146 ,A   147 ,B  148 ,D  149 ,G
  150 ,N  151 ,B  152 ,H  153 ,F  154 ,E  155 ,P  156 ,M  157 ,B   158 ,O  159 ,B  160 ,F  161 ,P  162 ,B  163 ,H  164 ,M
 165 ,E  166 ,A  167 ,L  168 ,K  169 ,R  170 ,P   171 ,E  172 ,H  173 ,M  174 ,H  175 ,F  176 ,M  177 ,A  178 ,N  179 ,L  180 ,K
  181 ,E  182 ,J  183 ,J   184 ,F  185 ,D  186 ,H  187 ,J   188 ,G  189 ,G  190 ,L  191 ,F  192 ,A  193 ,A  194 ,N  195 ,A


?
10      KBO     DBLX+BASIC      KB(OR)  12(16)K+16K     26.1(+26.1)
*QUIT
PROGRAM TERMINATION

Ready
```

You've invested a lot of time and money into your computer . . .
It's time that investment paid off!

THE COLOR ACCOUNTANT

The Programmer's Institute introduces **THE COLOR ACCOUNTANT**, the only complete personal financial package specifically designed for the Atari 400/800 and the TRS-80 COLOR computers. This unique package includes:

1. **Complete Checkbook Maintenance**
2. **Chart of Accounts Maintenance**
3. **Income/Expense Accounts**
4. **Net Worth Statement**
5. **Payments/Appointments Calendar**
6. **Color Graph Design Package (graphs any files)**
7. **Stock Market Analysis**
8. **Home Budget Analysis**
9. **Schedule 1040 (Long Form)**
10. **Decision Maker**
11. **Mailing List**

After the initial setup, **THE COLOR ACCOUNTANT** requires less than an hour of data input each month.

The checkbook maintenance program is the key to the entire package. Once your checkbook is balanced, the checkbook summary file will automatically update the home budget analysis, net worth, and income/expense statements. You can then graph any file, record bills and appointments, make decisions, print a mailing list, analyze various accounts or stocks, and even calculate taxes.

All programs are menu-driven and allow add/change/delete. Each file and statement can be listed to screen or printer, and saved to cassette or diskette.

THE COLOR ACCOUNTANT also comes with 40 pages of documentation that leads you step-by-step through the entire package. This package requires 16K for the TRS-80 COLOR Ext. Basic. The Atari 400/800 requires 24K for cassette and 32K for diskette.

($75 cassette, $80 diskette).

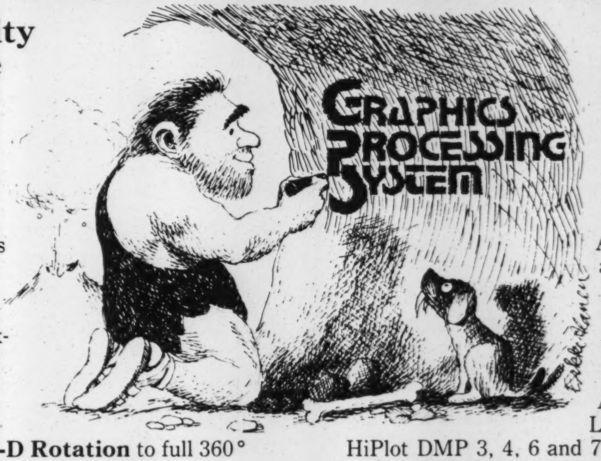
FREE OFFER!

Order before Sept. 30, 1982 and you will receive **ABSOLUTELY FREE** Itemized Deductions (Schedule A) *and* Income Averaging (Schedule G).

PROGRAMMER'S INSTITUTE
a division of **FUTUREHOUSE**
P.O. Box 3191, DEPT. 1-A
CHAPEL HILL, NC 27514
MasterCard/Visa Welcome
10 AM - 9 PM, Mon - Sat
See your local dealer or order direct
1-919-489-2198
Add $2 postage and handling to all orders.

CIRCLE 246 ON READER SERVICE CARD

STONEWARE'S AMAZING NEW GRAPHICS PROCESSING SYSTEM



Professional quality graphics for the Apple II Plus.

After two years of development, Graphics Processing System is the ultimate in fast, low cost, easy-to-use graphics programs. Graphics Processing System creates and edits images in the same manner word processors work with text.

Graphics Processing System features: **Grid Maker** for working with scale and proportion ■ **Colors** can be mixed and used to color lines, objects and backgrounds ■ **Two Zoom** powers for greater detail resolution ■ **2-D Rotation** to full 360° ■ **Duplication** on screen, to disk, and from disk ■ **Text Capabilities** in upper case A-Z, 0-9, and all characters on the Apple keyboard ■ **Modify or Erase** a portion of an image without having to start from the beginning ■ **Enlarge or Reduce** images ■ **Change Proportions** vertically and/or horizontally ■ **Print Overlays** separately and in different colors ■ **Accesses** 16K RAM card ■ **Compatible** with other Apple HiRes graphics ■ **Uses** Apple compatible game paddles and joystick ■ **Speaks** directly to the Apple Silentype printer and accommodates graphic dump programs for other printers ■ **Professional Version** is also compatible with Apple Graphics Tablet, Symtec Light Pen, Houston Instruments HiPlot DMP 3, 4, 6 and 7, HP7470A Plotter, Strobe 100 Plotter, IDS 460 and 560 Graphics Printers, Epson MX80 Printer with Graphtrix.

Only **$179.** for Professional Version and **$69.** for Standard Version.

STONEWARE INCORPORATED
50 Belvedere Street San Rafael CA 94901 (415) 454 6500
1982 Stoneware Incorporated TELEX II: 910-384-2016 STONEWARE SRFL

Requires 48K Apple II Plus, one or two Apple Disk drives, B&W or color screen, game paddles or joystick. Optional: 16K RAM Card or Language Card, Apple Silentype or other B&W or color printer. GPS is available through leading software distributors and Apple Dealers. Or send check, money order, Visa or MasterCard (include expiration date) to Stoneware Incorporated. California residents add 6% sales tax.

Reg. Trademarks: Apple: Apple Computer, Inc., Symtec: SYMTEC, Inc., HiPlot: Houston Instruments Div. of Bausch & Lomb, HP7470A: Hewlett-Packard Co., Strobe 100: Strobe, Inc., IDS 460 & 560: Integral Data Systems, Inc., Epson MX80: Epson America, Inc.

CIRCLE 279 ON READER SERVICE CARD

Valley Bomber

Tim Basham

In this game you are the pilot of a bomber. Your mission is to destroy the valley, but not the mountain. The mountain is depicted with x's and the valley with white spaces.

Press the space bar to release the bomb. Points are given for hitting the valley. If you hit part of the mountain, the points are doubled and subtracted from your score.

The game ends when a bomb misses completely. Press Enter at the end of the game to play again. □

Tim Basham, 6040 Janet, Taylor, MI 48180.

```
10 X=256:CLS:ONERRORGOTO5000
20 S=0
100 A$=" "+CHR$(143)+CHR$(140)+CHR$(140)+CHR$(188)+CHR$(140)+CHR$(140)+CHR$(140)
:B$=CHR$(140)
105 C$=CHR$(191)
110 PRINT@576,"XXXXXX";:PRINT@633,"XXXXX";:PRINT@640,"XXXXXXXX";:PRINT@695,"XXXX
XXX";:PRINT@704,"XXXXXXXXXXX";:PRINT@755,"XXXXXXXXXXX";
120 PRINT@768,"XXXXXXXXXXXXXXX";:PRINT@815,"XXXXXXXXXXXXXXX";:PRINT@832,"XXXXXXX
XXXXXXXXXXX";:PRINT@876,"XXXXXXXXXXXXXXXXXX";:PRINT@896,"XXXXXXXXXXXXXXXXXXXXXXX
";:PRINT@935,"XXXXXXXXXXXXXXXXXXXXXX";:PRINT@960,"XXXXXXXXXXXXXXXXXXXXXXXXXXX";
130 PRINT@996,"XXXXXXXXXXXXXXXXXXXXXXXXXX";
140 FORN=582TO632:PRINT@N,C$;:NEXT:FORN=648TO694:PRINT@N,C$;:NEXT:FORN=715TO754:
PRINT@N,C$;:NEXT:FORN=783TO814:PRINT@N,C$;:NEXT:FORN=850TO875:PRINT@N,C$;:NEXT:F
ORN=919TO934:PRINT@N,C$;:NEXT:FORN=986TO995:PRINT@N,C$;:NEXT
145 IFU=1THEN200
150 GOSUB6000
200 Q$=INKEY$:IFQ$=" "THEN300
210 GOSUB1000
220 GOTO200
300 A=X+67:FORN=ATO1022STEP65
310 PRINT@N,B$;
311 ONERRORGOTO5000
315 Z=PEEK(15360+N+65):IFZ=24ORZ=88THENJ=1:GOTO400
320 IFPEEK(15360+N+65)<>32ANDPEEK(15360+N+65)<>58THEN400
340 GOSUB1000:PRINT@N,"  ";:NEXT:GOTO200
400 PRINT@N," ";:PRINT@N+64,"  ";:N=N+64:IFN>576THENP=5
410 IFN>640THENP=25
420 IFN>704THENP=50
430 IFN>768THENP=75
440 IFN>832THENP=100
450 IFN>896THENP=200
460 IFN>960THENP=500
470 GOTO500
500 IFJ=1THENP=P*2:S=S-P:PRINT@0,"","THIS BOMB","TOTAL SCORE";:PRINT@64,"",-P,S;
:J=0:GOTO200
510 S=S+P:PRINT@0,"","THIS BOMB","TOTAL SCORE";:PRINT@64,"",P,S;:GOTO200
1000 X=X+1:IFX>310THENPRINT@X,"          ";:X=256
1010 PRINT@X,A$;
1020 RETURN
5000 IFS>RTHENR=S:PRINT@407,"";:INPUT"WHAT IS YOUR NAME";X$:PRINT@384,CHR$(30);
5010 PRINT@384,"SCORE TO BEAT      :::     GAME OVER!     ::: ";X$;" ";R;
5020 FORN=320TO382:PRINT@N,"*";:NEXT:IFINKEY$=CHR$(13)THENU=0:RESUME10
5030 FORN=510TO448STEP-1:PRINT@N,"*";:NEXT:IFINKEY$=CHR$(13)THENU=0:RESUME10
5040 FORN=320TO382:PRINT@N," ";:NEXT:FORN=510TO448STEP-1:PRINT@N," ";:NEXT:IFINK
EY$=CHR$(13)THENU=0:RESUME10
5050 GOTO5020
6000 FORX=0TO20:PRINT@X," VALLEY BOMBER-"+A$;:NEXT
6010 FORX=34TO54:PRINT@X,A$;:NEXT:PRINT@54,"          ";
6020 PRINT:PRINT:PRINT"THE OBJECT OF THE GAME IS TO BOMB AWAY THE VALLEY BUT NOT
":PRINT"THE MOUNTAIN.":PRINT"EACH LAYER HAS DIFFERENT POINTS (GIVEN BELOW).":PRI
NT"THE GAME ENDS WHEN YOU MISS COMPLETELY (THROUGH THE BOTTOM)."
6030 PRINT:PRINT:PRINT"PRESS ENTER TO CONTINUE.                 GOOD LUCK!!!!";
6065 PRINT@606," 5  ";:PRINT@670," 25 ";:PRINT@734," 50 ";:PRINT@798," 75 ";:PRI
NT@862," 100";:PRINT@926," 200";:PRINT@990," 500";
6070 IFINKEY$=""THEN6070
6080 U=1:GOTO10
```

apple®

TRS-80 I & III
IBM

PRO FOOTBALL FANS!
INTRODUCING

THE GOLD EDITION

THE MOST SOPHISTICATED SYSTEM EVER DESIGNED FOR THE PREDICTION OF PRO FOOTBALL POINTSPREADS

After four years of research, development, and testing, **SDL** is proud to present **"The Gold Edition"** — A system that predicts pro football pointspreads with a degree of accuracy that has never been obtainable until now. From weeks 6-16 during the 1980 and '81 seasons **The Gold Edition** has been a proven **winner in all categories** over the Las Vegas line:

SEASON	FAVORITES		UPSETS		TOTAL		TOTAL GAMES
	HOME	AWAY	HOME	AWAY	HOME	AWAY	
1981 SEASON:	57%	80%	63%	70%	59%	71%	154
1980 SEASON:	53%	67%	70%	66%	61%	66%	154
TWO YEAR AVG:	**55%**	**73%**	**66%**	**68%**	**60%**	**68%**	**308**

THE GOLD EDITION ALSO FEATURES....

- Completely Menu Driven Screens
- Easy to Use Commands
- Accesses One or Two Disk Drives
- Requires Only 10-15 Minutes to Update
- Includes Two Seasons of Data
- Can be Used Year After Year
- Predicts Real or Hypothetical Games
- Predicts Accurate Pointspreads
- Predicts Accurate Over/Under Scores
- Can Generate 20-35 Pages of Analysis Weekly
- Hardcopy Reports Include...
  - Full Season Schedule
  - Team Performance Detail Analysis
  - Team Performance Summary Analysis
  - YTD Divisional Standings
  - Computer Prediction Analysis
  - Pointspread Differential Graphing
  - Over/Under Differential Graphing

The Gold Edition provides the highest quality of information necessary to beat the Las Vegas Line — Prove it to yourself — **Order Now**
Retail price includes **The Gold Edition** System Diskette, Data Diskette with two years of data, and over 50 pages of comprehensive documentation with padded leather binding **$199.50**

See All **Systems Design Lab Software** at your local dealer or order from

SDL

2612 ARTESIA BLVD., SUITE B
REDONDO BEACH, CA 90278
(213) 374-4471

VISA

master charge
THE INTERBANK CARD

Apple is a registered trademark of the Apple Corporation

CIRCLE 286 ON READER SERVICE CARD

MALA

Educational Programs
For Your Pet For Only

$48

For 8 Issue Subscriptions

Each "MALA" comes to you on cassette with 4 brand new programs to load and run on your Pet.

• PET • COMMODORE • VIC •

COMM*DATA SYSTEMS, INC.

P.O. BOX 325
MILFORD, MICHIGAN 48042
[313] 685 · 0113

• PET • COMMODORE • VIC •

GAMES FOR YOUR VIC

VIC TREK • HANGMAN
TANK • YAHTZEE
DAMSEL • NAB PLUS
AND MANY MORE

only **$7.95** Each

▶ FREE Program Summaries available

CIRCLE 132 ON READER SERVICE CARD

Reliable Business Software

DATASMITH software requires no previous computer experience, so it can be used effectively by your present office staff. The menu-driven systems feature extensive error detection and correction facilities, so they are "friendly" to the user.

- GENERAL LEDGER. Everything you need to keep the books. Features easy-to-use data entry and error correction, trial balance, fast post, and a variety of comprehensive reports. Automatic error detection keeps the books in balance. Writes checks and makes journal entries in one operation.
- PAYROLL. A very flexible system that adapts to a wide variety of needs. Features Federal, state, and local tax calculations, EI credit, and special pay and deduction amounts. Prints all necessary reports, paychecks, and W-2 forms.
- DATA MANAGER. A powerful generalized data management system that lets you define, enter, update, sort, select, and print reports from a database of your own design. Applicable to almost any job where records must be kept, this system can replace literally hundreds of programs.

Put your computer to work with these sophisticated systems now. Programs are available for 48K or larger two-disk systems in your choice of code for Microsoft BASIC-80* under CP/M*, IBM* Personal Computer BASIC, or Micropolis* BASIC.

DATASMITH

Box 8036, Shawnee Mission, KS 66208, (913) 381-9118

CIRCLE 154 ON READER SERVICE CARD

side...the other side...the

Guy Kewney

Only one thing really puzzles me about the new Basis computer. That is: when the German firm took the normal Apple II and added a Z-80 and CP/M and an 80-column display, and an RS-232 and a parallel I/O port and DOS 3.3 in ROM all for around $2000, why didn't they put it in a portable case like the Osborne?

That paragraph represented a brave attempt to pretend that Sinclair's ZX Spectrum is not the biggest news in Europe since Clive launched the ZX81 last year. It is.

What the Spectrum is not, however, is the greatest machine Sinclair could have been expected to launch, even though he has promised the $100 floppy disk with it.

The machine itself probably looks more impressive to an Englishman than to an American because of the context. Here, the British Broadcasting Corporation sponsored microcomputer has been getting all the attention. First because of its very attractive spec, and second, because of all the foul-ups in getting it into production and distribution.

Sinclair feels that his ZX81 was the ideal micro for anybody who was planning a TV series on understanding computers. He felt that with a few tweaks and adjustments, that machine could have been turned into a colour display machine with nicer features, and for a lot less money, than the design the BBC picked.

And he thinks that he's done it.

For someone accustomed to machines like the Atari 400 and aware of Commodore's new Ultimax game machine, the Spectrum might seem almost ordinary. In Europe, however, the Atari 400 has been priced at unreasonably high levels by distributors, even given the now honourable tradition of overpricing imported micros. And the Ultimax is not yet available.

So Sinclair's claim that his £125 16K machine provides more colour display, better Basic and costs less than half the BBC micro's £300 plus, makes it attractive to many buyers.

It has its own faults. It is not quite the slowest machine on the market; there are few slower. Its colour display may be high resolution, but it isn't high definition—a good colour television is wasted on it, and a monitor would only be needed to eliminate what is known as "dot crawl" on the PAL encoding system used in much of Europe for colour TV broadcasting.

As a games machine, it needs a paddle socket, and doesn't have one. Sinclair expects this to be simple enough to do, since he has provided two commands (IN and OUT) in the operating software to do the equivalent of PEEK and POKE to the external port. But simple or not, it isn't there, and will cost extra.

Apparently, it has a BEEP command giving good sound and tone generation ability, but unless the machine is tested in total silence, few can hear it. And while its ability to store programs and data on audio tape may be worlds better than Sinclair's previous machine, the ZX81, all that really proves is how ropey the ZX81 was (is) at tape handling.

No, as the thing stands, it is a threat to the Commodore VIC and apart from that, only to the ZX81. When it starts getting really interesting will be when Sinclair launches his Microdrive.

(*Editor's note: See the Fall 1982 Creative Computing Buyer's Guide to Personal Computers, Peripherals and Electronic Games for a review of the Spectrum.*)

The Microdrive

The Microdrive is still a matter for speculation only. Sinclair says it is a 100K diskette with true random access, on which it would be possible to run CP/M. That, however, doesn't prove a thing. It could be a tape loop.

Sinclair is known to have been talking to the Hungarian firm which has announced a three-inch cartridge diskette, selling for around £60 in Britain.

According to the distributors of the Hungarian drive, it was developed in 1974, and the Japanese microfloppy is based on that design. "The reason the Japanese design hasn't appeared in Europe, and the reason it has been held up so long, is that the Japanese have been trying to find a way around our patents," claimed the distributor.

Sinclair's deal with the Hungarian firm fell through when they offered to supply a simplified version of the product for £20, say sources. Sinclair apparently wanted a £12 cost, and so went off to design his own.

These sources say that the Sinclair Microdrive is not a diskette in the conventional sense. Instead, it uses a spiral tracking arm, which takes either 3.5 or seven seconds to traverse the diskette surface from start to finish, and reads serial data.

A cursory look at the bit rate, capacity and other known parameters of the drive would appear to bear this theory out. Until Sinclair files his patents and launches the device, theory is all we have to go on, because he isn't saying.

More Atomic Particles

Back at Sinclair's successful rival, the company that actually did design the BBC micro, the Spectrum is to be emulated. Acorn has named all its machines after atomic particles: the first was the Atom, then the Proton (became the BBC micro) and now the Electron and the Gluon are on the way.

Games players will be interested in the Gluon. It is a cut-down version of the classy BBC micro, in a cheap little box like Sinclair's Spectrum, and without a few of the more expensive BBC features. It will run most software that is sold for its big brothers, and will sell for the same price as the Spectrum.

One thing it will have, however, is a fully "soft" keyboard with every key programmable to generate whatever character (or in some cases, string of characters) the user desires.

Whether this is all good news remains to be seen. I've had enormous fun playing with Chuck Peddle's machine, the Sirius/Victor, where every key and every displayed character is soft. One careless character sent to screen or keyboard configuration sections of memory, and the most entertaining screw-ups can be arranged—and you don't even need machine code programming experience to succeed! Try using the TYPE command on a few files...

The main thing about the BBC micro, however, is not the fact that the Spectrum and the Electron can be made to mimic its features at half the price, but the fact that it can be turned into the world's first 32-bit microcomputer.

Well, not yet. But sooner than you probably think. National Semiconductor has gone out and told the world that it has a family of new microprocessor chips called the 16000, and that the 16032 has now been selected by a handful of customers for their next generation machinery.

From the perspective ofo anybody who doesn't know the BBC microcomputer, the concept is probably a yawn. For those who have seen the Tube on the BBC machine, it sounds like tomorrow's world today.

The BBC micro has the ability to turn itself into a "slave" processor, handling disk, keyboard and display operations plus networking and anything else of that nature. Most of these facilities are already arranged in the operating software of the standard machine.

The Torch Tube

At the moment, the Tube is used by a company called Torch, which has plugged a Z-80 processor in as the master. Users speak of this as a very elegant and efficient design, since the BBC micro has a bewilderingly large choice of display modes plus very efficient disk and network handling abilities.

With the National Semiconductor chip, however, the Tube allows the user of a 32-bit microprocessor with a very sophisticated instruction set and a range of languages and operating software due out within 12 months, to start running programs today, using the BBC display and disk routines.

Acorn is so delighted with the success of this notion, that it has decided to extend it to Apple, Commodore and Radio Shack users. They, poor things, cannot use the ultra-high speed Tube for data and control operations; instead they use an ordinary RS-232 link.

"But we are looking at ways of implementing the Tube on those micros. And if we can do it, we can offer American users a $3500 upgrade to their systems with Unix, 32-bit file structures, 256K of standard memory, and a hard disk," said Chris Curry, marketing boss of Acorn, recently.

It may not wipe out anybody else, but it should get Acorn into the US within a year.

One little irony to end on: the Osborne microcomputer may be heading for something of a price scandal. It is still selling (quite well) at £1500 including local taxation. The difference between this and the American $1800 price hasn't really struck home yet, because people still don't believe the machine can be produced for £1500.

But bulk-buy deals are starting to be talked about, and unit prices of £500 for the bigger orders (for 1500 Osborne 1 machines) make the standard retail price look rather different. And it is only three years since Adam Osborne himself stood up at a hobbyist conference in London, and told delegates they were fools to be conned by US exporters into paying inflated "import" costs on top of the US price. I agree with Adam. ☐

Peripherals Unlimited...

FANTASTIC PRICES!

OUR FAST SERVICE, PRODUCT SELECTION AND OUR CUSTOMERS' SATISFACTION MAKE US #1.

ZENITH	
Z-89-48K	$2299
Z-90-64K DO	$2588
Z-19 Terminal	$777
Z-121 Monitor 12	$149

ATARI COMPUTERS	
Atari 800 16K	$649
Atari 400	$318
Atari Interface Module	$174
Atari 810 Single Disk	$444
Atari 830 Modem	$166
Programmer	$59
Entertainer	$84
Star Raiders	$34
16K Mem. Exp. for Atari	$74
32K Mem. Exp. for Atari	$114

NEC PRINTERS	
7710/30 Spinwriter R/O	Call
7720 Spinwriter KSR	Call
3510/30 Spinwriter R/O	Call
NEC DOT MATRIX	
PC-8023	$474

Call for prices on ribbons, etc.

MORE PRINTERS	
Anadex 9500/9501	$1295
Anadex DP-9000	$1049
Okidata Microline 82A	CALL
Okidata Microline 83A	CALL
Okidata Microline 84	CALL
Tractor (OKI 80 + 82 only)	$60
Diablo 630	$2044

MONITORS	
Sanyo 12" GRN Phosphor	$266
Sanyo 12" Black + White	$239
Amdek 12" 300 GRN Phosphor	$149
Amdek 12" Color I	$319
Amdek Color II	$779
NEC 12" GRN Phosphor	$164
NEC 12" Color	$344

EPSON PRINTERS	
MX-80 w/Graphics	CALL
MX-80 FT (Friction + Tractor)	CALL
MX-100 (15" Carriage)	CALL

Call for prices on Ribbons, Cables and Interfaces

NEC-PC 8000 Series Microcomputer	
PC-8001A Computer w/32K	$888
PC-8012A w/32K + Exp. Slots	$588
PC-8031A Dual Mini Disk	$888
PC-8032A Add-on Mini Disk	$777

Call for Software Prices

FOR THE LOWEST PRICE CALL TOLL FREE

1-800-343-4114

ORDERING INFORMATION

Our order lines are open 9AM to 6PM EST Monday thru Friday. Phone orders are welcome: same day shipment on orders placed before 10AM. Free use of Mastercard and VISA. Personal checks require 2 weeks clearance. Manufacturer's warranty included on all equipment. Prices subject to revision. C.O.D.'s accepted.

For service, quality and delivery call:

PERIPHERALS UNLIMITED
(617) 655-7400
62 N. Main St. • Natick, MA 01760

CIRCLE 237 ON READER SERVICE CARD

The Graph Paper

Part Four: End of The Beginning

David Lubar

Last month, we covered basic animation and a bit of page flipping. Rounding out the topic this month, I will discuss collision detection and paddle control and other areas related to animation from Basic. Then we will take a look at some ways to alter the whole hi-res screen from Applesoft.

This will be the last portion of the series to use Basic. Starting next month, we will consider machine language exclusively. It really isn't any harder—just different. Meanwhile, let's get on to those collisions.

Crash, Pow

In almost any game, objects interact, and the program must be able to determine when and where these interactions occur. There are two methods with which I am familiar: coordinate checking and bit checking.

Coordinate checking is rather straightforward. You know the size of each object in your program, and you know its location. To see if one object hits another, you merely check whether their edges are within striking range. A simple example of this occurred in the animation program from last month. Each time the square was plotted, its X and Y locations were checked to see if it had "collided" with the border.

For two moving objects, just subtract the X coordinate of one from the X coordinate of the other and take the absolute value. If this is less than half the total width of the two objects, they are sharing an X location. The same check is made for the Y coordinates. If two objects are sharing some portion of both X and Y, they are touching.

Assume that one object has a width of 10 and another has a width of 8. If the difference between their X coordinates is less than 9 (one half the total width), then they overlap along the X axis. Unfortunately, while this method works well enough for squares, it fails to fully handle objects with irregular shapes. In this case, a bit check is required.

When an object is plotted, you must check whether one of its pixels has been placed on a spot where there is already a set pixel. If so, it has collided with something. If there is more than one possible object with which to collide, the program must make a coordinate check, but at least the existence of a collision has been verified by the bit check.

While Applesoft has no specific command for this, the ROM routines do contain a collision counter. This routine checks each pixel placed on the screen and increments a counter if there has been a collision. The counter is at location $EA (234 decimal), and it is updated after every DRAW or XDRAW.

Any shape drawn at a fixed scale, color, and rotation will always return the same value when placed on a black background. If the number changes, the shape has interacted with something.

The collision counts for DRAW and XDRAW work, in slightly different manners, but each will be constant until there is a collision.

For DRAW, the value is 0 until there is a collision. For XDRAW, the value is equal to the number of pixels in the shape when it is drawn on a black background. Since the collision counter is changed whenever a shape is drawn, its value is only valid for the most recent DRAW or XDRAW.

If you have several objects to plot, the collision count should be checked, or saved for later checking, after each shape is drawn. When we start doing machine language animation, we will develop routines that perform collision checks.

Under Control

All games require player input, usually through the keyboard or with paddles. For paddle control, we will look at the general case of a ship moving at the bottom of the screen. The paddle returns a value between 0 and 255 (though Apple paddles are notorious for dropping out below the high range). Your program can use this number to move objects in three ways: directional indication, absolute positioning, and delayed absolute positioning. In each case, the value of the paddle determines what happens to the X coordinate of the player's ship.

Directional indication breaks the paddle into three divisions. If the paddle is left (counterclockwise) of center, the ship moves to the left. If it is right of center, the ship moves right, and if it is in the central area, the ship stops. A subroutine for this method is shown in Listing 1. It simply uses the paddle value to determine the sign of DX.

Absolute positioning is the simplest method. Here, the X location of the object is based directly on the paddle value.

There are two limitations with this method. First, since the paddle range is only 0-255, the range of X locations is limited to 256 positions. This is no problem if you put a border around the playing field. The other problem is that, in Basic, where the paddle isn't read that frequently

APPLE SPEAKS INTELLIGENTLY!

The people who dared to teach Atari to talk are again challenging the microcomputer establishment with the **VOICEBOX** Speech Synthesizer for Apple. This low cost intelligent peripheral can speak thousands of words unassisted, generated directly from its firmware ROM dictionary located on its plug-in card. This means that speech, with variable intonation and speed, can be used in any of your apple programs without ever having to bother loading a disk. And, in case you want to expand your dictionary to include unusual words or words in foreign languages, you can easily define them with our 64 phonemes and store them by the thousands on one of the six special dictionaries provided for on our disk.

In addition your **VOICEBOX** for Apple can be easily coded to sing on key with uniform barlengths and you can store (record) your songs on disk, retrieving and modifying sections whenever you want. With the disk system, you'll also enjoy an educational random sentence generator and graphic speech animation! The **VOICEBOX** for Apple will run on 32K Apple II with Applesoft or Apple II Plus systems equipped with sixteen-sector disk drives. **VOICEBOX** for Apple comes with loudspeaker and disk. The Alien Group also makes a less expensive **VOICEBOX** for Apple with all features (including expandable disk dictionary), but excluding firmware ROM and singing capability. Speaker is optional on this unit.

For Atari users, the **VOICEBOX** for 16K and up Atari plugs directly into the serial port. No extra cables are needed and no speaker is needed since the speech comes directly over your TV monitor. This unit has all speech synthesis features except singing and firmware ROM.

AL-3001 **VOICEBOX** for Apple. With firmware ROM, singing capability and speaker $215.00
AL-3501 **VOICEBOX** for Apple. Without firmware ROM, singing capability and speaker $139.00
AL-4001 Speaker for AL-3501 (the AL-3501 will also work with any other speaker) $15.00
AL-5001 **VOICEBOX** for Atari $169.00

All mail orders are on a 10 day moneyback guarantee if you're not completely satisfied. When ordering enclose check or money-order or state VISA or MASTERCARD number. Send mail orders to:

THE ALIEN GROUP
27 West 23rd Street
Dept. **CC-3**
New York, New York 10010

or Telephone orders
from 10 AM to 6 PM
New York time
(212) 924-5546

ALSO AVAILABLE AT LEADING COMPUTER STORES THROUGHOUT THE WORLD.

CIRCLE 104 ON READER SERVICE CARD

SAVE $$ **DISCOUNT PRICES** SAVE $$

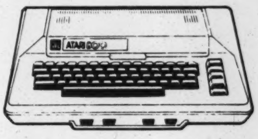
apple computer

APPLE COMPUTER SYSTEMS SOLD ONLY IN STORE. CALL FOR PRICES.

RAM MEMORY
FOR TRS-80, APPLE II
16K SET 4116's (200 NS) 24.95

General Information:
We carry a large selection of hardware and software by other companies. Send for our catalog.
We are an authorized repair center for **APPLE, ATARI, NORTH STAR, AND EPSON.**

ATARI

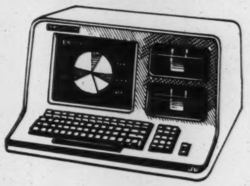


400 16K	349.00
800 16K	699.00
410 Recorder	89.00
810 Disk	449.00
822 Printer	359.00
825 Printer	779.00
830 Modem	159.00
850 Interface Module	179.00
CX853 RAM	89.00
CX70 Light Pen	64.00
CX30 Paddle	18.00
CX40 Joystick	18.00

VERBATIM DISKETTES

Box of 10 5¼"	29.50
Box of 10 8"	39.50

NorthStar



ADV-2Q-64K	3150.00
ADV-1Q-64K-HD-5	5195.00

HRZ-2Q-64K	2795.00
HRZ-1Q-64K-HD-5	4695.00
HRZ-1Q-64K-HD-18	6295.00
5 MB HARD DISK	2350.00
18 MB HARD DISK	4195.00

PRINTERS

EPSON	
MX-70	299.00
MX-80	469.00
MX-80 F/T	569.00
GRAFTRAX	90.00
INTERFACE (APPLE)	75.00
CABLE (APPLE)	22.50
IDS	
560G	1450.00
PRISM	1795.00
NEC	
3510 35CPS	1995.00
7710 55CPA	2650.00
8023A	599.00
OKIDATA	
MICROLINE 80	389.00
MICROLINE 82A	549.00
MICROLINE 83A	849.00
MICROLINE 84	1245.00
C.I.T.O.H.	
STARWRITER 25CPS	1595.00
STARWRITER 45CPS	2195.00
FORMS TRACTOR	275.00

PRICES SUBJECT TO CHANGE WITHOUT NOTICE. MARYLAND RESIDENTS ADD 5% SALES TAX

FREDERICK COMPUTER PRODUCTS, INC. 5726 INDUSTRY LANE FREDERICK, MD. 21701

TO ORDER CALL: (301) 694-8884

Store Hours:
MON. THRU THURS. 9:30 AM-9:00 PM
FRI. AND SAT. 9:30 AM-5:00 PM

CIRCLE 170 ON READER SERVICE CARD

the object will appear to jump when the paddle position is changed by a large amount.

This brings us to the third method. In delayed absolute positioning, the object moves toward the absolute position indicated by the paddle, but the movement is in small, fixed increments. For instance, suppose that the X location of the ship is 45. If the next paddle reading is 100, the absolute method would place the ship there. The delayed method would place it at 46, then 47, and so on until it reached 100. Many games use this method, which gives the player a good deal of control. See Listing 2 for an example.

The delayed and directional methods can be modified by adding acceleration. In this case, the object moves slowly at first, then moves in greater steps as it continues in any direction. Accelerating control is good for games where a player might have to make fine adjustments in his position, but might also want to get across the screen quickly.

A joystick is just two paddles. If you want to move an object in both horizontal and vertical directions, use a joystick and treat the X and Y coordinates separately.

The keyboard is used in the directional manner. Press one key to move left, another to move right, and a third to stop. An alternative is to make each keypress produce a small movement. This requires repeated presses on the part of the player, but also gives a feeling of control. The method used depends on the nature of the game.

The best way to read the keyboard is by directly PEEKing location -16384. If the value there is greater than 127, a key has been pressed. The value returned by the PEEK is the ASCII value of the letter. The quickest way to find the ASCII value of a letter is to ask the Apple with PRINT ASC ("X"), where X stands for the letter in question. This is much faster than using a chart.

Listing 1.

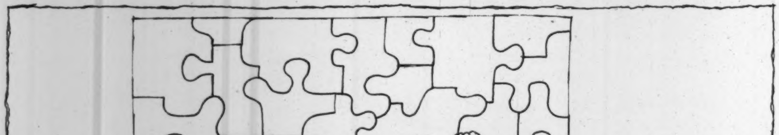
```
10 P =  PDL (0)
15  REM  CONVERT PADDLE VALUE TO
     RANGE FROM -1 TO +1
16  REM  WHOLE FUNCTION CAN BE DO
     NE ON ONE LINE BY REPLACING
     P WITH PDL(0) IN LINE 20
20 DX = DX +  INT (P / 86) - 1
```

Once the keyboard has been read and a value greater than 127 found, the keyboard should be cleared with a POKE -16368,0. While the choice of which keys to use is up to you, most games use either I, J, K, and M or A, Z, left arrow and right arrow for movement, with the spacebar being used for stopping motion. Most high quality games also allow the user to redefine these keys.

Gun Control

Many readers wanted to know how to program a missile being shot from an object. This month's winning question comes from Michael P. Mariotti, who asks, "How do you fire from one or more points on an object that you are controlling, using as your weapons dots, lines, etc., and hit an object that is also moving?"

There are two parts to doing this: getting the missile started at the proper location, and making it move in the right direction. The starting point of the missile is based on the location of the ship firing the missile and the size of the ship. One way to simplify matters is to define the ship with the nose as the starting point. That way, the coordinates used to DRAW or XDRAW the ship will be the same as those used for the starting point of the missile. If this is not done, you will have to determine how much to add or subtract from the coordinates of the ship to find the starting point of the missile.



"...can you call back?...he just dropped out..."

Listing 2.

```
1  REM  X IS OBJECT LOCATION, DX
     IS CHANGE TO ADD TO X
10 P =  PDL (0)
20  IF X > P THEN DX = 1
30  IF X < P THEN DX =  - 1
```

Just count the distance from the start of the shape to the firing point, and add the proper offset to each variable. For instance, if a ship has been defined starting in the upper left corner, and the nose of the ship is four pixels to the left and two down from the corner, the X location of the missile would be four greater than that of the ship, and the Y location would be two greater.

A missile is moved just like anything else. It needs a change in X and a change in Y. Using standard Apple screen coordinates if DX is 0 and DY is -1, the missile will move diagonally toward the lower right corner. To speed up the missile, use values greater than 1.

To create a line rather than a dot, you can use HPLOT to start the line, then move it by adding a dot to the front while taking one away from the end. (This is an important concept. If you are moving something that is homogeneous, such as a line, there is no need to move the whole thing. Just lop off one end and add to the other.)

The one problem with using integers for DX and DY is that it gives a very limited number of angles at which the bullet can travel. That brings us to the topic of fractional values.

While you can't plot an X location of 23.5, you can add .5 to an X value. This will produce a change of 1 every second time the missile is moved. A simple program to demonstrate fractional values for DX and DY is given in Listing 3. This concept is used extensively in machine language animation.

A quick way to use fractional values in a Basic program is to put them in an array. Then use the rotation of the ship as an index into the array. For example, if the ROT of the ship is 16, you would use DX=DX(16), the value of which has to be calculated by you (tedious but necessary).

Speaking of rotation, many people wanted to know whether there is any way to prevent the gross distortion produced by rotating a shape. The only way is to use several shapes, defining one shape for each rotational view of the object. Shapes can be reused when the rotation is 180 degrees, but even a 90 degree rotation will produce a slight distortion since the width of a pixel is approximately 1.5 times its height.

All this talk of shapes has brought about the urge to preach. Bear with me for a moment. Shape tables are great for playing around and for doing light-weight

7 Good reasons why you should subscribe to *Creative Computing.*

Creative Computing
Six Languages Which Are For You?
IBM Personal Computer

It's the Number One magazine of computer applications and software!

There's one place you can always be sure of learning more about microcomputer software and applications: *Creative Computing.*

Every month *Creative Computing* provides you with a continuing education on everything related to microcomputers and computer equipment. Useful articles, "how to" tutorials, exciting new applications, games and "no holds barred" reviews of the latest software and equipment make up a major part of *Creative Computing*'s editorial content.

We give you probing features on programming breakthroughs and important news. Plus in-depth articles on elementary, intermediate and advanced software and applications topics—to help you develop your knowledge and skills, save hundreds (perhaps thousands) of dollars in unneeded software, discover uses for your personal computer that you might never have considered. Articles that increase your overall "computer consciousness." Here's how:

1 *Creative Computing* gives you things to actually do with a computer.

Just owning a computer isn't enough. You've got to know what to do with it. That's why applications are our primary focus. Text editing, animation, graphics, business simulations, data base and file systems, music synthesis, control of household devices, communications, games—some of the applications and software you'll learn about in *Creative Computing.*

2 *Creative Computing* discusses business applications in simple, nontechnical language.

If you're a business person who needs to know about the latest developments in word processing and office applications, turn to *Creative Computing.* We clarify such business applications as investment analysis, futures evaluations, data base management, mailing list programs, text editing, word processing and simulations. And all the software available for business people.

3 *Creative Computing* helps you decide which computer equipment is best for you.

Our tough, no-nonsense equipment profiles arm you with the facts before you walk into a computer store. You'll know the right questions to ask and how to cut through the jargon and sales hype. We give you authoritative guidance in deciding what you need, what you don't need—and what's right for you and your pocketbook.

4 *Creative Computing* covers computer education in depth.

We started out as a computer education publication, and we're still committed to the educational community. We regularly carry articles on designing educational software, evaluating educational software, teaching concepts and terminology in computer education, text editing applications for literature and computer simulations in the classroom—plus a great deal more.

5 *Creative Computing* brings you hours of mind-expanding game entertainment.

We've got a soft spot for the computer game addict—and computer game software. We know you want to understand more about the new computer games flooding the market: which ones are easiest to learn? Require the most skill? Offer the most surprises? Give you the best graphics? Provide the most challenge? Contain a new twist? *Creative Computing* brings you the answers.

6 *Creative Computing* features the state of the art.

Columns on the most popular personal computers, a "software legal forum," letters to the editor. Reviews of books, games, organizations, dealers and events. Fascinating interviews with leading innovators, equipment designers, program developers and game inventors—men and women who'll give you a real glimpse of the future!

7 Our price is right.

By subscribing to *Creative Computing* now, you can save as much as 33% off the full subscription price. To learn elsewhere what you'll learn from *Creative Computing*, you might spend hundreds of dollars in course fees and books. Then you'd have to winnow out what you could use from all that you'd learned. But *Creative Computing* does that for you, so you'll have time to enjoy your own computing interests. And that saving of time makes this offer very inexpensive indeed

Join over 150,000 *Creative Computing* readers by subscribing today! Just use the coupon at right.

SAVE UP TO 33%!

Creative Computing · P.O. Box 5214 · Boulder, Colorado 80322

YES! Send me *Creative Computing* for:

☐ One year (12 issues) for $19.97—I save 20%!
☐ Two years (24 issues) for $36.97—I save 26%!
☐ Three years (36 issues) for $49.97—I save 33%!

Savings based on full one-year subscription price of $24.97.

Check one: ☐ Payment enclosed. ☐ Bill me later.

Mr./Mrs./Ms.________________________
(please print full name)

8H104

Address____________________ Apt.______

City________________________

State____________ Zip____________

Offer valid in U.S. and possessions only. Please allow 30 to 60 days for delivery of first issue.

ATARI®

Entertainer Kit	88.00	**Atari 800 16K**	735.00
Programmer Kit	56.00	**Atari 400 16K**	359.00
Communicator Kit	345.00	**Atari 410** Cassette	80.00
Microsoft Basic	72.00	**Atari 810** Disk	480.00

ALL ATARI SOFTWARE 20% OFF
Plus Loads of 3rd Party Software!
VOTRAX TYPE'N'TALK: 340.00
ALSO **EPSON & CENTRONICS PRINTERS**
ZENITH & TELEVIDEO TERMINALS

BBI Mail Order is a company made up of computer professionals. We are able to provide low prices as well as technical support. Give us a call and find out why we consider the Atari the best home computer on the market today. You won't be disapointed.

BBI Mail Order
Specializing in Atari Home Computers
P.O. Box 365
Newton Highlands, MA 02161
(617) 964-3080

CIRCLE 118 ON READER SERVICE CARD

MEMOREX
FLEXIBLE DISCS

WE WILL NOT BE UNDERSOLD!! Call Free **(800)235-4137** for prices and information. Dealer inquiries invited and C.O.D.'s accepted.

PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401. In Cal. call
(800)592-5935 or
(805)543-1037

CIRCLE 233 ON READER SERVICE CARD

SOFTWARE FOR THE ATARI
For the ATARI 400/800 Computers

WORD SEARCH PUZZLE MAKER—Make word search puzzles with your words or ours and an 80-column printer. **24K Cassette: $24.95 24K Disk: $24.95**

CHRISTMAS MUSIC—SETS 1, 2, & 3: Sing along with your Atari. Words and music (8 carols each). For use with the Atari Music Composer cartridge. Great gift for the whole family. **16K cassette, 16K Disc - $24.95 each. Specify set number.**

ELECTRONIC GRADE BOOK—Version 2.0—The teacher's aid for grade reporting. Includes weighted scores, letter and number grades, and several methods of reporting grades. Disk version has more advanced routines.
Disk 40K. Cassette 32K. $64.95 each

All programs come with a manual. Disk versions come with AUTORUN.SYS file

Please add $2 postage and handling per order
Michigan residents add 4% sales tax.

Computer's Voice
2370 Ella Dr.—Dept. 130
Flint, MI 48504
(313)-238-5585

CIRCLE 144 ON READER SERVICE CARD

Graph Paper, continued...

Listing 3.

```
1  REM  DEMONSTRATION OF FRACTION
     AL DX AND DY
2  REM  TRY DIFFERENT VALUES SUCH
      AS .1, -2.5, ETC.
3  REM  ONCE AGAIN, THIS IS JUST
     A FRAMEWORK. FEATURES SUCH A
     S ERROR TRAPPING HAVE BEEN L
     EFT OUT.
10  HGR
20  HCOLOR= 3
30 X = 140:Y = 80
40  HPLOT X,Y
50  HOME : VTAB 21
60  INPUT "ENTER DX VALUE ";A$
70 DX =  VAL (A$)
80  INPUT "ENTER DY VALUE ";A$
90 DY =  VAL (A$)
100  HCOLOR= 0
105  REM  TO SEE A FULL LINE INST
     EAD OF A MOVING DOT, TAKE OU
     T LINE 110
110  HPLOT X,Y
120 X = X + DX:Y = Y + DY
130  IF X < 0 OR X > 279 OR Y < 0
      OR Y > 159 THEN 200
140  HCOLOR= 3
150  HPLOT X,Y
155  FOR I = 1 TO 20: NEXT I: REM
      DELAY TO LEAVE DOT ON SCRE
     EN BETWEEN ERASURES
160  GOTO 100
200  PRINT "AGAIN ";
210  GET A$
220  IF A$ = "Y" THEN 30
```

graphics. The topic is worth covering, and we will see a bit more of it next month when delving into Applesoft ROM routines. But Applesoft shape tables are nearly useless when it comes to doing games with fast animation. They are very slow and very limited. They belong to the past. We will be leaving them behind soon and seeing how to make the Apple do things your way. We will be creating our own graphics subroutines. And once you get a taste of that, there is no turning back. You will be hooked, I promise.

Screening Room

Besides using standard graphics commands, you can manipulate the screen with POKEs. Listing 4 changes the hi bits of all the bytes in the hi-res screen. It is a bit slow, but it should give you an idea of what can be done. Remember, each byte on the screen consists of seven bits that are used for plotting, and one that determines color.

Another interesting trick is to turn all on bits off and vice versa. One way to do this is shown in Listing 5. There is undoubtedly a faster algorithm. See if you can find one. This type of manipulation can't help being slow, but it does serve as good introduction to techniques that will be used later in machine language.

Listing 5.

```
10  POKE 49232,0: POKE 49236,0: POKE
     49239,0: REM  TURN ON HI-RES
      SCREEN
20  FOR I = 8192 TO 16383
30 D = 128:GNU = 0
40 OLD =  PEEK (I)
50  IF OLD < D THEN GNU = GNU + D

55  IF OLD >  = D THEN OLD = OLD -
     D
60 D = D / 2: IF D >  = 1 THEN 50

70  POKE I,GNU
80  NEXT I
```

Listing 4.

```
10  POKE 49232,0: POKE 49236,0: POKE
     49239,0: REM  TURN ON HI-RES
      SCREEN
20  FOR I = 8192 TO 16383
30 BYTE =  PEEK (I)
40  IF BYTE < 128 THEN  POKE I,BY
     TE + 128
50  IF BYTE > 127 THEN  POKE I,BY
     TE - 128
60  NEXT I
```

Later on, we will redo programs 4 and 5 in machine language as an exercise in translation. For now, see what other effects you can accomplish by POKEing to the hi-res screen.

Odds and Ends

The sine wave program mentioned a few months ago is beginning to haunt me. I promised a version with moving rungs, and will produce it this month, but I must explain the down side of this whole affair.

As I mentioned, the programs were produced during an evening of hacking with a fellow programmer, and the results were interesting. Unfortunately, the disk containing the programs has eluded discovery for the last month or so (suspicion runs high that is was left in a cabin in Lake Tahoe by the aforementioned fellow programmer). Anyhow, I re-created one of the programs, but re-creations just don't ever seem to equal the original.

Listing 6 is a program that does move the rungs of the sine wave. The program was made faster than the one listed several months ago by doing most of the calculation beforehand. While this produces a wait before the first image appears, it reduces the time required from then on. If the disk turns up, I will list some of the niftier variations in a future article. The lesson is obvious; either make backups of everything or don't let your hacking partner go to Tahoe.

Well, that's a wrapup for this month. Next time, we'll dive into ROM routines and begin the trek away from Basic. □

Listing 6.

```
10  HGR
15  DIM Y%(200)
20  FOR I =  - 10 TO 10 STEP .1
30 Y%(100 + (I * 10)) =  SIN (I) *
     20
35  NEXT I
36 Q = 5:T = 1
37  FOR I = T TO 190 STEP 5
46  HCOLOR= 0: HPLOT I - 1,Y%(I -
     1) + 100 TO I + 19,Y%(I - 1)
      + 100: HCOLOR= 3: HPLOT I,Y
     %(I) + 100 TO I + 20,Y%(I) +
     100
50  NEXT I
60 Q = Q + 1: IF Q = 10 THEN Q =
     5
65 T = T + 1: IF T = 6 THEN T = 1

70  GOTO 37
```

TAKE CHARGE OF YOUR GROWING COLLECTION OF DISK-BASED SOFTWARE!

- A professional database, dedicated to your disk catalog!
- Consolidates up to 1,200 catalog entries into a single file!
- Instantly retrieves any file name, sorts in 4 seconds!
- Produces well organized reports of all your programs, nicely formatted to your printer for easy insertion into a notebook, etc!
- Reviewed by InfoWorld as Excellent in Performance and Ease of Use, and "... delivers on all its claims... an elegant system... well worth it."

LOOKING FOR SOMETHING???
THANK SDS
DISK Library
SDS
doug 6-82

EASY TO LEARN & USE!

Ask your local Apple dealer about Disk Library or call or write SDS for a free catalog.

disk Library™

THE SOFTWARE MANAGEMENT SYSTEM

southwestern data systems™

P.O. BOX 582 • SANTEE, CA 92071 • TELEPHONE: 714/562-3670

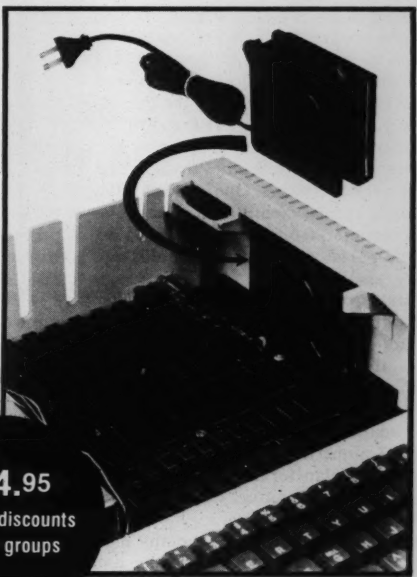
CIRCLE 271 ON READER SERVICE CARD

KEEP YOUR APPLE* cool as a cucumber

How? . . . with a Cool-Mark II fan unit.

- *Protects against overheating caused by plug-in boards and prolonged use.*
- *Saves down time and repair due to overheating.*
- *Mounts easily* ***INSIDE*** *your Apple II* in seconds, without hardware.*
- *High performance airflow and low noise level.*
- *Precision ball bearings = long service life.*
- *One year warranty.*

Cool-Mark II Fan Unit



$34.95
Quantity discounts to user groups

See Your Authorized Apple Dealer or Order Direct

How To Order: Send money order or check for $34.95, plus $2 for UPS surface shipping anywhere in continental USA. California residents add 6% sales tax.

Send money order for PROMPT delivery. Personal checks must clear before shipment.

Dealer inquiries invited.

Call Collect To:(213) 287-9945, COD orders accepted.

Mark Four Imports

P.O. Box A • San Gabriel, Ca. 91776 • (213) 287-9945

*Apple is a registered trademark of Apple Computer Inc.

CIRCLE 197 ON READER SERVICE CARD

images...ibm images...ibm im

Will Fastie

Photo 1. The Wang Professional Computer.

I was fortunate enough to attend the National Computer Conference (NCC) this year in Houston, as I did last year in Chicago. Last year I was stunned at the number of Z80- or 8085-based, CP/M compatible computer systems displayed. It just seemed as though everybody had one.

This year was different. This year, everybody seemed to have a 16-bit machine of some description. What really surprised me was that most of these systems were built around the 8088 or 8086 CPU, the same one used in the IBM Personal Computer. Not only that, but of those that did have the 8088/8086, most offered MS-DOS (read IBM DOS) as the operating environment. It looks like the IBM PC has really paved the way.

There were three machines that I found particularly interesting. One is special, and deserves a special mention. It is the Compass Computer, from Grid Systems. It is a 9-pound portable computer that folds into a very small package. A primary size advantage comes from the flat screen which displays a full screen of text or graphics with a 240 x 320 resolution. Nonetheless, it packs a full-size keyboard, 256K of main memory, 256K of bubble memory, integral modems and other communications adapters, the 8086 processor, and the 8087 numerics processor. There were some spectacular (for their speed) graphics demonstration programs running on the machine.

The Compass does not have any mass storage other than the bubble, as it is intended as a remote terminal and processor device which connects with central processing systems. All this for only $8150. I covet one. Just think, I could talk to my IBM Personal from remote locations . . . .

The other two systems that impressed me were the Digital Equipment Corporation (DEC) Personal Computers and the Wang Professional Computer. The Wang really caught my eye.

What Wang announced is a small system based on the 8086 with a socket for the 8087. The basic system includes 128K of memory, a monochrome display, and one 320K floppy disk drive. The price of this system is $3395. A second floppy is $400. The 8086 runs faster than the 8088 in the IBM PC—8MHz vs. 5. In addition, Wang announced a 5 megabyte, 5-1/4" Winchester hard disk for $2000!

The system comes with MS-DOS and a user-friendly "shell" which Wang designed. (A shell is a program that "surrounds" the operating system and provides an interface to it. Wang's is menu-driven.)

So, what we have here is a system which is largely compatible with the IBM PC, but about $400 lower in price, and faster to boot. It is also (and I hate to admit this as I stare directly into my machine) very attractively styled — more so than the IBM. The price for the hard disk is *incredibly* aggressive, and is sure to set the pace for hard disk pricing from the big companies.

Wang is providing two software packages initially. The first is word processing (what a surprise) which is compatible with other Wang WP systems. The second is the Multiplan spreadsheet program from Microsoft. Both packages are priced at $500.

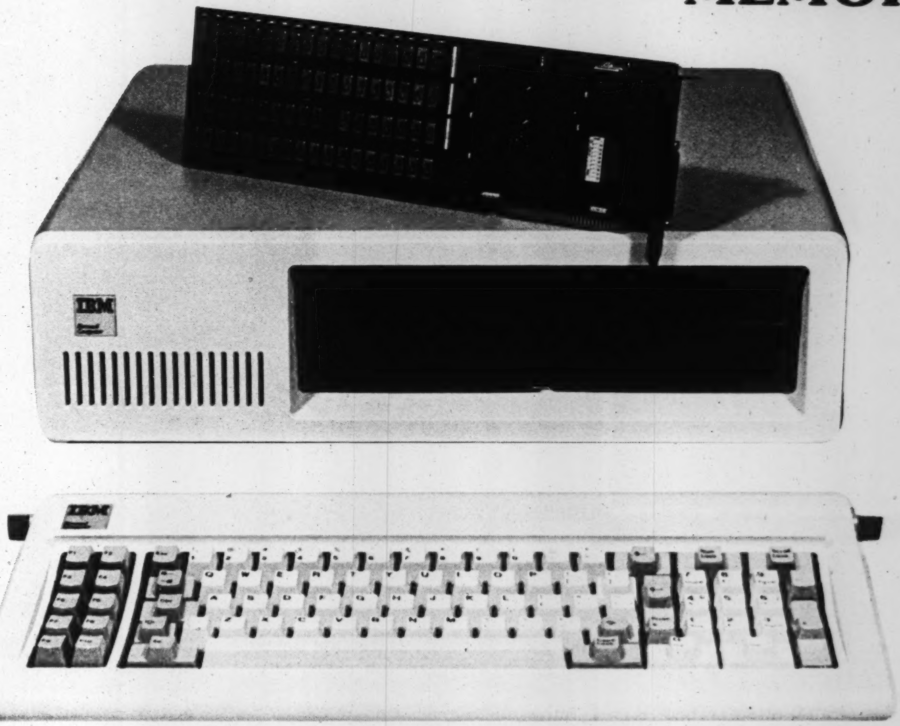
The DEC systems simply cannot be ignored because of the company, although my reaction to them is somewhat mixed. DEC actually offered three systems, and not just models, but different *families* of

---

W. H. Fastie, 7110 Sheffield Road, Baltimore, MD 21212. Correspondence can only be acknowledged when a stamped, self-addressed envelope has been provided. Source Address: TCP 394.

NEW

512KB WITH RS232-C PORT IBM PERSONAL COMPUTER MEMORY!



SINGLE BOARD 512KB WITH RS232-C IBM PERSONAL COMPUTER MEMORY

Designed Specifically for IBM's PERSONAL COMPUTER is Chrislin Industries newest CI-PCM+ and CI-PCM Memory Modules.

- Pin-to-pin compatibility.
- Full one year parts and labor warranty.
- On-board parity with interrupt on parity error.
- Off the shelf deliveries.
- Addressable as a contiguous block in 64KB increments thru 1 megabyte.

CI-PCM without RS232-C
256K x 9 .... $475.00

CI-PCM+ with RS232-C
512K x 9 .... $895.00

DON'T ASK WHY WE CHARGE SO LITTLE, ASK WHY THEY CHARGE SO MUCH.

Chrislin Industries, Inc.

31352 Via Colinas • Westlake Village, CA 91362 • 213-991-2254
TWX 910-494-1253 (CHRISLIN WKVG)

CIRCLE 129 ON READER SERVICE CARD

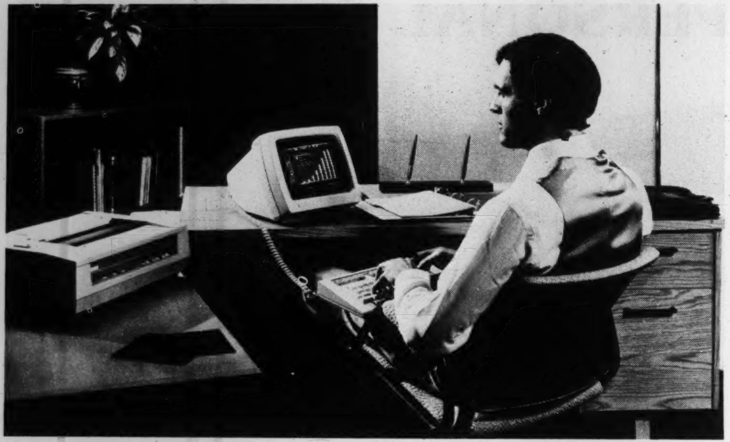


Photo 2. The DEC Rainbow 100 Personal Computer. (The system unit is not visible.)

systems. The Professional 300 series is based on the PDP-11 instruction set, and I think it is, therefore, most interesting to DEC users as a machine at the low end.

The DecMate II is primarily a word processing system, and is based on the PDP-8 instruction set. (Incredible. DEC just seems to keep selling PDP-8's.) The Rainbow 100 is the "personal" computer offering, and is very interesting.

The Rainbow 100 comes with two processors, the 8085 and the 8088. A special attraction of the machine is the operating system, dubbed CP/M-80/86, which is simply CP/M-80 and CP/M-86 rolled into one. DEC has put the system together so that the software can tell which CPU to use with a feature they call "softsense," which detects which CPU the program requires. Quietly, in the fine print, DEC mentions that MS-DOS is supported. The price of the Rainbow 100 is $3495. (For an in-depth evaluation of the Rainbow 100, see the November 1982 issue of *Creative Computing*.)

DEC produced a book called *Guide to Personal Computing* and handed out copies at the NCC. Of course, it's really a guide to *DEC* personal computing, but it is very well done. The book includes a section that explains how things like printers and graphics displays work — topics that are especially helpful for the novice.

There were some interesting announcements at Comdex/Spring in Atlantic City which I learned about just in time for the column. The first was that *Multi-Plan*, a powerful spreadsheet program and the first of the "Multi-Tool" series from Microsoft, is now available to end-users. Previously the package had only been sold to OEMs. However, while a host of computer systems are supported, there is no indication that the tool is available to owners of the IBM Personal Computer!

Multi-Plan is available for computers based on the 8088/8086 and running MS-DOS, but not the PC? Well, here's what I think this means. Whenever IBM enters into negotiations with a firm about anything, the firm must agree not to discuss the discussions with anybody else. I consider it very likely that IBM will announce the produce soon (if not by the time you read this). I asked IBM directly, and got the standard, but polite, refusal to speculate.

Interesting Comdex announcement #2 is the Hyperion Portable computer from Dynalogic, a Canadian company. The standard system, weighing 20 pounds and including a full keyboard, two 320K diskette drives, a 7" CRT, the 8088 processor, and 256K of RAM costs $4995. What is really interesting about this machine is the company's claim of full IBM PC software compatibility.

The operating system is MS-DOS, the Basic is Microsoft Basic, the processor runs at 4.77 MHz (same as the PC), the keyboard layout includes all the same keys in a slightly different layout; in short, a tiny IBM PC. The price is even competitive with the IBM, if you factor in reasonably priced memory and communications adapters. This machine will be very interesting to owners of multiple IBM units, such as Fortune 1000 companies, who have a need for portable computers as well.

Why have I spent so much time in an IBM column talking about other computers? Because I'm about to indulge, once again, in

Some Speculation

Here we sit, a little less than a year after the introduction of the IBM PC (that is, at the time of writing), with a market flooded with competition for the IBM. The Wang in particular, I think, is in a very good position. By many comparisons, the IBM has dulled.

The Wang is aggressively priced. DEC offers the dual-processor as a standard feature. And a host of other companies, including Commodore, Vector Graphic, North Star, Zenith (Heath), Sony, and others less well-known, have introduced systems based on the 8088 or 8086 processor and supporting MS-DOS. To me, it all means just one thing: it is time for IBM to strike.

First prediction: an IBM hard disk, 5 megabytes, in the last quarter of this year. This will probably be the point at which IBM DOS (MS-DOS) Version 2.0 will be announced, and that alone represents an important step forward. (More on MS-DOS 2.0 in subsequent columns, but rumor has it that Microsoft has already delivered Version 2.0 to IBM.)

I hope (and expect) that the disk will be aggressively priced. I would like to see some kind of innovation from IBM here, like a big bubble memory or large quantities of RAM at disk prices, but I guess it will just be a Winchester.

Second prediction: an IBM letter-quality printer before the end of the year. This is certainly an easy task for IBM; they simply have to give up the notion that the DisplayWriter and the DataMaster can be protected. What I would also like to see, but don't think will happen, is a dual-mode matrix printer, one capable of higher speeds (200 cps) for normal printing but very high quality printing at slower speeds (40 cps).

Third prediction: *Multi-Plan* from IBM before the end of the year.

Fourth prediction: 3270 and 2780/3780 emulation hardware and software from IBM, by late this year or early next. I just don't see how IBM can go on for long without having this stuff, because at least half the Personal Computers sold are going into IBM National Accounts, those serviced by the Data Processing Division (or whatever it is currently called).

With that many systems going into companies with installed mainframes, third parties will provide this product if IBM does not, and I don't think IBM wants to appear foolish by not supporting its own big systems, especially when these functions can be touted as "Office Automation" capabilities.

Final prediction: another model of the PC. The two possibilities are a system selling for under $1000 (maybe even $500!) and oriented to the consumer market, or a repackaged version, styled and configured to compete more effectively with the likes of Wang and DEC in the $4000+ market segment. Since IBM has stated their intention to address the business market first

Apple® II's best LISP just got better!

LISP (for List Processor) was developed at MIT in the late 1950's. As one of the oldest languages still in active use, LISP's applications include artificial intelligence, natural language processing, robotics and educational and psychological programming. LISP's unique features give the programmer the power to develop software that goes far beyond the limitations of BASIC or PASCAL.

In use at hundreds of colleges and by many hobbyists around the world, P-LISP has been acclaimed by experts in the field as the best implementation written for the Apple II®

Now you can get the newly released Version 3.1 at a reduced price. The P-LISP Package includes: P-LISP 3.1, a complete 52-page reference manual, and the specially written P-LISP Tutorial.

Now Only $149.95 including tutorial

Compare P-LISP to Datasoft's APP-L-ISP

Only P-LISP has:

- Floating Point Math
- HiRes Graphics
- Property Lists
- Function Trace
- ONERR Error Trapping
- User Defineable Memory Allocation

P-LISP:

- 83 Functions
- 15K ELIZA Program
- P-LISP Tutorial

APP-L-ISP:

- 63 Functions
- 3K "Doctor" Program
- Winston & Horn Book

Orders Toll-Free 800-523-0725; In Pa.: 215-387-1500
4005 Chestnut Street, Phila. Pa. 19104
Dealer Inquiries Invited

gnosis

Apple is a registered trademark of Apple Computer, Inc
APP-L-ISP is Copyright 1981 by Special Software Systems
Applesoft in ROM required for Floating Point Math and HiRes Graphics

CIRCLE 172 ON READER SERVICE CARD

IT'S KICK-OFF TIME

NFL PREDICTION PROGRAM

Program available for the IBM PC, Apple II and TRS-80 Model I or III.

Available now from Apparat for

$34.95

TO ORDER CALL

800-525-7674

Apparat, Inc.

4401 S. Tamarac Parkway
Denver, CO 80237 (303) 741-1778

CIRCLE 311 ON READER SERVICE CARD

PROFIT!

SHORT TERM TRADER used to invest in stocks for the past four years could have made you annual returns of 14% to 93%. Compounding these annual returns would have **TRIPLED YOUR DOLLARS** in four years.

NOT JUST ANOTHER "PORTFOLIO" PROGRAM technical charting of price/volume averages enables your computer to make **BUY-SELL DECISIONS** on any stock.

MENU DRIVEN

GOOF PROOF ENTRY on formatted screens

HANDLES STOCK SPLITS

COMMISSION COST estimates for both full service and discount brokers

PROJECTS VALUE OF CALL OPTIONS

HI-RES GRAPHS of market indicators and individual stocks.

RUNS on APPLE II PLUS® with one drive.

Send for free brochure. 80 page manual and 2 disk program $54. Manual alone $8. Visa and MasterCard users include account number and expiration date.

® Registered trademark of Apple Corporation.

MICRO STATISTICS
DIVISION OF KCR INCORPORATED
100 N.TRAVIS, BOX 1263, SHERMAN, TX. 75090
214/868-1019

CIRCLE 307 ON READER SERVICE CARD

SRA Educational Courseware: "Because learning matters"

Computer Drill and Instruction: Fact Track™ (Grades 1-6)
For your Apple*, Atari*, IBM* and Radio Shack* personal computers.

Fact Track gives timed drill on the facts of addition, subtraction, multiplication, and division and reports student speed and performance. Choice of difficulty level. Choice of competitive or noncompetitive format. Choice of drill type: facts, mixed practice with facts, extension skills. Binder with Diskette and Teacher Guide, $100.00.

*Registered trademarks.

☐ Yes! I want Fact Track!
Please contact me immediately.
☐ Send me literature about Fact Track.

Name____________________
School____________________
Address____________________
City, State, Zip____________________
Telephone____________________

For faster service, call SRA toll-free:
(800) 621-0476
Or mail this coupon to:

SRA®

SCIENCE RESEARCH ASSOCIATES, INC.
155 N. Wacker Drive, Chicago, IL 60606

CIRCLE 276 ON READER SERVICE CARD

and the consumer market last, I think the repackaged system is likely by early in 1983. Somewhere in this scenario, I predict that the 8087 Numerics Processor and the big brother of the 8088, the 8086 CPU, will get plugged in.

Well, I went pretty far off the deep end that time. Please, don't keep score!

A Graphics Dump Program

I know what you are thinking. You are saying "Sure, Will. Just like you've been promising since who knows when." Yeah. But I finally delivered.

Listing 1 is my program to dump a medium resolution graphics image to the IBM 80 cps printer with Graftrax-80 or Graftrax-Plus installed, or a similarly equipped Epson MX-80 or MX-100. The program produces a horizontal image on the paper and will produce a printed image of either black and white or color displays.

The technique used by the program is simple. After creating a graphic display, the program uses the Basic function POINT to read the setting of each of the 64,000 dots that make up the medium resolution image. These settings are saved in the array LINES for later printing. They must be saved because the printer prints eight rows of dots at a time, and my program collects information one row at a time. I could have written the program to collect eight points at a time and send that value to the printer, but the technique of saving the data is more conducive to other orientations of the picture, which I will discuss in a minute.

The LINES array is organized as 25 lines of 320 elements. When the collection of data is complete, each element of the array contains the setting of eight dots taken from the eight vertical positions present in each column of each row. This data representation also happens to be just what the printer needs to produce the horizontal picture. It is, thus, a simple matter to place the printer into graphics mode and transmit the lines, one at a time.

Well, not quite. In Version 1.0 of IBM Basic, all PRINT statements interpret the string they print. This is quickly evident when a program tries to LPRINT CHR$(7). The expectation is that a character with value 7 will be transmitted to the printer, but the effect is that the system beeps (code 7 is a bell character) and nothing goes to the printer. Basic Version 1.1 is supposed to have this capability, but I haven't had a chance to test it.

So to get the data to the printer without risk of interpretation, I had one of two choices. The most obvious (at least to me) was to write an assembly language interface to the printer routine in the ROM BIOS. Although this would have been easy for me, it would have resulted in a fairly cryptic Basic program — one not

Listing 1.

```
1000 ' GPRINT - Graphics Dump Program for the IBM Personal Computer
1010 ' Will Fastie -- Original version Feb 82, revised June 82
1020 '
1030 ' This program transfers the contents of the Color/Graphics Adapter
1040 ' memory to a GRAFTRAX-80 or GRAFTRAX-Plus equipped IBM 80 CPS or
1050 ' EPSON MX-80 printer, to an EPSON MX-100 printer, or to a new
1060 ' generation EPSON MX-80 or 100 printer (for which GRAFTRAX-Plus is a
1070 ' standard feature).  Medium resolution images (200 x 320) are
1080 ' converted, whether in black and white or in color.  Color
1090 ' images, which can be displayed using a 4 color set, are printed
1100 ' in black and white.
1110 '
1120 ' The program assumes that the program is executed on a machine
1130 ' equipped with the Color/Graphics Adapter only.  If both
1140 ' display adapters are present, switch to the Color/Graphics
1150 ' adapter first, then run this program.
1160 '
1170 ' -- Global program declarations
1180 DEFINT A-Z
1190 DIM PIN.MASKS(8)
1200 FOR PIN = 0 TO 7
1210   PIN.MASKS(PIN) = 2^(7-PIN)
1220 NEXT PIN
1230 ESC = 27
1240 CR = 13
1250 '
1260 ' This section should be written to suit your particular needs.  For
1270 ' demonstration purposes, it loads a previously stored image from the
1280 ' disk into the memory of the Color/Graphics Adapter.  You could
1290 ' generate the image here instead.
1300 '
1310 KEY OFF: CLS
1320 INPUT "Enter filename of image:  ",F$
1330 SCREEN 1,0                       'Medium resolution, color enabled
1340 DEF SEG = &HB800                 'Base address of CG/A memory
1350 BLOAD F$, 0
1360 '
1370 ' This section converts the image in memory to a numeric array
1380 ' containing the information required for the printer.
1390 '
1400 ' -- Declare an array to hold the data
1410 NR.ROWS = 200:  NR.COLS = 320
1420 ROWS.PER.PRINTED.LINE = 8
1430 NR.LINES = NR.ROWS/ROWS.PER.PRINTED.LINE
1440 DIM LINES(NR.LINES, NR.COLS)
1450 '
1460 '-- Initialize the array to 0
1470 FOR L = 0 TO NR.LINES-1
1480   FOR COL = 0 TO NR.COLS-1
1490     LINES(L, COL) = 0
1500   NEXT COL
1510 NEXT L
1520 '
1530 ' This section reads each point from the video memory, translates
1540 ' the points to a black and white representation, and builds
1550 ' the data for the printer.
1560 ' The ROW and COL variables are used to calculate the position in
1570 ' which the point value should be placed.  The positions 0 through 7
1580 ' represent the printer's print head pins, from top to bottom.  The
1590 ' value in each position in the array corresponds to these pin
1600 ' positions.
1610 '
1620 FOR ROW = 0 TO NR.ROWS-1
1630   L = ROW\ROWS.PER.PRINTED.LINE
1640   FOR COL = 0 TO NR.COLS-1
1650     IF POINT(COL, ROW) = 0 THEN GOTO 1670
1660       LINES(L, COL) = LINES(L, COL) OR PIN.MASKS(ROW MOD 8)
1670   NEXT COL
1680   BEEP
1690 NEXT ROW
1700 '
1710 ' This section prints the data by line to the printer.  No assumption
1720 ' is made about the postion of the paper.
1730 '
1740 GOSUB 2110                                   'establish line spacing
1750 FOR L = 0 TO NR.LINES-1
1760   N = NR.COLS: GOSUB 2170                    'put printer in graphics mode
1770   FOR COL = 0 TO NR.COLS-1
1780     C = LINES(L, COL): GOSUB 2000
1790   NEXT COL
1800   C = CR: GOSUB 2000                         'advance the paper
1810 NEXT L
1820 LPRINT: LPRINT                               'space between this and next
1830 '
1840 END
1850 '
1860 ' This routine transmits the value in C to the printer.
1870 ' A routine like this is necessary because PRINT in BASIC interprets
```

WE WILL NOT BE UNDERSOLD

SOFTWARE

MICROPRO	
Wordstar	$269.00
Mailmerge	89.00
Customization Notes	$359.00
Spellstar	$239.00
Datastar	$199.00
Calcstar	$199.00
MICROSOFT	
Basic Interpreter	$349.00
Basic Compiler	$389.00
Fortran 80	$499.00
Cobol 80	$695.00
DATA BASE	
FMS80	$595.00
dBase II	$599.00

NEW! IBM PC SOFTWARE NEW!

INFORMATION UNLIMITED	
Easy Writer	$289.00
Easy Speller	$149.00
Easy Filer	$319.00
VISICORP	
Visicalc 256K	$190.00
VisiDex	$199
VisiFile	$229
VisiTrend/VisiPlot	$229
MICROPRO	
Wordstar	$299.00
MISCELLANEOUS	
Supercalc by Sorcim	$229.00
Superwriter by Sorcim	$289.00
Home Accountant Plus	$139.00
ENTERTAINMENT	
Deadline	$39.00
Temple of Apshai	$29.00
Curse of Ra	$15.99

Call For More IBM Software And Accessories

DISK DRIVES

CCI 100 for the TRS-80 Model 1	
5¼ 40 track	$299.00
CCI 189 for the Zenith Z-89	
5¼ 40 track	$379.00
CORVUS 5M with Mirror	$3089.00
CORVUS 10M with Mirror	$4489.00
CORVUS 20M with Mirror	$5389.00
CORVUS Interfaces	CALL
RANA SYSTEMS add-on Disc Drive for the Apple II	
Elite One 40 Track	CALL
Elite Controller	CALL
Elite Two 80 Track	CALL
Elite Three 80 Track double-sided	CALL

DISKETTES

Maxell 5¼ single side	$39.00
Maxell 8 single side	$49.00
Maxell 5¼ double side	$45.00
Maxell 8 double side	$55.00
BASF 5¼	$26.95
BASF 8	$36.00
Verbatim 5¼	$26.95
Verbatim 8	$36.00
Wabash 5¼	$24.95
Wabash 8	$29.95

IBM PC ACCESSORIES

64K Card by Microsoft	$435.00
Joystick by T & G	$49.00
128K Card	$579.00
192K Card	$629.00
256K Card	$699.00
Combo Card by Apparat	$249.00

Call for more IBM PC add-ons

For fast delivery, send certified checks, money orders, or call to arrange direct bank wire transfers. Personal or company checks require one to three weeks to clear. All prices are **mail order only** and are subject to change without notice. **Call for shipping charges.**

APPLE SOFTWARE

MICROPRO	
Wordstar	$269.00
MailMerge	$99.00
Spellstar	$149.00
DataStar	$199.00
Calcstar	$189.00
Supersort I	$159.00
VISICORP	
VisiCalc	$199.00
VisiTerm	$79.00
VisiDex	$199.00
VisiPlot	$169.00
VisiFile	$199.00
VisiSchedule	$259.00
VisiTrend/Plot	$239.00
VisiPac	$539.00
MISCELLANEOUS	
Micro Courier	$219.00
Screen Director	$129.00
Executive Briefing System	$169.00
Supercalc	$199.00
Personal Filing System	$115.00
PFS Report Writer	$75.00
Word Handler	$169.00
CP/M Power	$59.00
ENTERTAINMENT	
Wizard and Princess	$29.00
Twerps	$28.00
Beer Run	$28.00
Zork I, II	$26.95
Deadline	$39
Chop Lifter	$24.95
Pinball	$24.95
Cannonball Blitz	$29.95
Knights of Diamonds	$29.95
Midnight Magic	$32.00
Wizardry	$45.00
Time Zone	$79.00
Tuesday Morning Quarterback	$24.95
Crush, Crumble & Chomp	$24.95
Datestones of Ryn	$15.99
Morloc's Tower	$15.99
Star Warrior	$31.99
Snack Attack	$23.95
Star Blazer	$24.95
Kabul Spy	$29.95
Cyclod	$23.95

APPLE ACCESORIES

ADVANCED LOGIC	
Add-Ram 16K Card	$99.00
Z-Card CP/M for the Apple II	$225.00
Smarterm 80 Column Board w/Softswitch	$249.00
The Synergizer	
All of the above plus "The CP/M Handbook"	$545.00
Z-80 Card by Microsoft	$319.00
16K Card by Microsoft	$159.00
32K Card by Saturn	$199.00
Keyboard Enhancer II by Videx	$125.00
Videoterm by Videx	$259.00
Game Paddles by TG	$49.00
Joystick by TG	$49.00
Numeric Keypad by Keyboard Co.	$139.00
ALF 9 Voice Board	$159.00
ALF 3 Voice Board	$229.00
System Saver by Kensington	$75.00
Versacard by Prometheus	$229.00
8088 Card by Coprocessor	$789.00
Microbuffer II 16K w/graphics	$259.00
Microbuffer II 32K w/graphics	$299.00
APPLE INTERFACE CARDS BY CCS	
Serial Asynch. #7710	$139.00
Serial Synch. #7712	$149.00

Call for other CCS cards

RAM

16K Ram Kit for Apple II; TRS80 200 nano seconds, 4116 chips	$17.50

COMPUTERS

CALIFORNIA COMPUTER SYSTEM	
Mainframe 2200a	$485.00
Z-80 CPU 2810a	$265.00
64K RAM 2065	$569.00
Floppy Controller 2422a	$359.00
ZENITH	
Z-89 48K	CALL
Z-90 64K	CALL
Call For Prices On The Complete Zenith Line	
CASIO FX702P Pocket Computer	$179.00
Sanyo MBC1000 64K	$1649
Call For Prices On Complete Sanyo Computer Line	

PRINTERS

NEC 7710 Serial	$2395.00
NEC 7720 KSR	$2749.00
NEC 7730 Parallel	$2395.00
NEC 3510 Serial	$1850.00
NEC 3530 Parallel	$1850.00
NEC 8023 Dot Matrix 100cps	$539.00
Olivetti DY211 Letter Quality	
Daisy Wheel Printer	$1095.00
Parallel Only	$995.00
Epson MX-80	CALL
Epson MX-80FT	CALL
Epson MX-100	CALL
IDS 560	CALL
IDS Prism 80	CALL
IDS Prism 132	CALL
Okidata Microline 80	CALL
Okidata Microline 82A	CALL
Okidata Microline 83A	CALL
Okidata Microline 84	CALL
Centronics 739	$675.00
Datasouth 180 cps	CALL
Zenith Z-25 150 cps	CALL

MONITORS

Amdek 12" B & W	$109.00
Amdek 13" Color	$329.00
Sayno 9" B&W	$135.00
Sanyo 9" Green	$140.00
Sayno 12" B&W	$179.00
Sayno 12" Green	$189.00
Sanyo 13" Color	$359.00
Zenith 12" Green	$99.00
Zenith 13" Color	$339.00
Electrohome 13" HI-RES Color Monitor	$829.00
Electrohome 13" Color	$349.00
Electrohome 12" B&W	$179.00
Electrohome 12" Green	$189.00
Electrohome 9" B&W	$149.00
Electrohome 9" Green	$159.00

SPECIAL OF THE MONTH
RANA SYSTEMS
add-on disk drive for Apple II
Elite One 40 track CALL

TERMINALS

ADDS Viewpoint	$495.00
Zenith Z-19	$679.00
Televideo 910	$595.00
Televideo 925	$779.00
Televideo 950	$969.00

TELECOMMUNICATIONS

Prentice Star Modem	$129.00
Novation Cat Modem	$139.00
Novation D-CAT	$149.00
Novation AUTO-CAT	$199.00
Novation APPLE CAT	$299.00
Hayes Smart Modem	$249.00
Hayes Micro-Modem	$295.00
Hayes Chronograph	$225.00

The CPU Shop

master charge
THE INTERBANK CARD

VISA

TO ORDER CALL TOLL FREE 1-800-343-6522
420-438 Rutherford Ave., Dept. COOM, Charlestown, Massachusetts 02129

Hours 9 AM – 9 PM (EST) Mon.-Fri. (Sat. till 6)
Technical information call 617/242-3361

TWX- 710-348-1796

Massachusetts Residents call 617/242-3361
Massachusetts Residents add 5% Sales Tax

CIRCLE 151 ON READER SERVICE CARD

```
1880 ' some characters, and therefore cannot transmit arbitrary values.
1890 '
1900 ' This program uses the Printer Port on the IBM Monochrome Display
1910 ' and Parallel Printer Adapter.  If you just have the Printer Adapter,
1920 ' you must change the port values in this routine according to this table.
1930 '
1940 '    Port Name              MD & PPA            Just PPA
1950 '    ---------              --------            --------
1960 '    DATA in/out            &H3BC               &H378
1970 '    Printer Latch          &H3BE               &H37A
1980 '    Status Register        &H3BD               &H379
1990 '
2000 OUT &H3BE, &H6
2010 IF INP(&H3BD) <> &HDF THEN 2010
2020 OUT &H3BC, C
2030 OUT &H3BE, &H3F
2040 IF INP(&H3BD) <> &HDF THEN 2040
2050 RETURN
2060 '
2070 ' Subroutine to set line spacing to 8/72 of an inch.  Subsequent
2080 ' to this command, the printer moves the paper by this amount
2090 ' whenever a Carriage Return (13) is received.
2100 '
2110 C = ESC: GOSUB 2000: C = ASC("A"): GOSUB 2000: C = 8: GOSUB 2000
2120 RETURN
2130 '
2140 ' Subroutine to command the printer to consider the next N characters
2150 ' as Bit Image Graphics data.
2160 '
2170 C = ESC: GOSUB 2000: C = ASC("K"): GOSUB 2000
2180 IF N > 255 THEN C = N-256: GOSUB 2000: C = 1: GOSUB 2000
                ELSE C = N:     GOSUB 2000: C = 0: GOSUB 2000
2190 RETURN
```

easily understood. Instead, I opted to use the Basic INP and OUT functions to write a direct printer driver. It is not that the printer output routine is any easier to figure out, but at least it is completely written in Basic without resorting to any assembly language.

The printer routine outputs a single character to the printer by outputting it directly to the hardware printer port. The effect of the five-line routine can be simply described as telling the printer you are ready (the first OUT), waiting for the printer to be ready (the INP in the IF statement), sending the character and telling the printer to take it (the next two OUTs), and finally waiting for the printer to be ready (the final IF statement). This is really a brute force approach, but it works.

By the way, I'm grateful to Donald Johnson of Tonawanda, NY, for sending me his graphics dump program. He also resorted to this approach for the printer, and it was nice to have the confirmation that the technique works.

This program has one drawback: it is pathetically slow. My first version of the program took something like 40 minutes to construct the array and print the image. By carefully rewriting the program, I was able to reduce the time to under 15 minutes. However, this is still terrible. The time can be improved somewhat by resorting to PEEKs to get the screen data, but it will still be slow.

By comparison, the commercially available products which I will describe momentarily can get the same image out in one or two minutes because they are written in assembly language and run considerably faster than Basic. That single fact makes the available programs worth every penny you pay for them. The slow speed of my program is the reason for the BLEEP statement. It is there to let you (and me) know that the program is still running.

My program is rather simple, but it can be rewritten to produce any of the images the commercial programs can generate. As you will see, those programs can vary the intensity of the print, print vertically or horizontally, and print different sized pictures. To do this, you need only change the way the data read by POINT is stored in LINES and choose the appropriate Epson mode. It may also be necessary to revise the program so that it prints more than one dot per picture element in order to produce an image with the proper "aspect ratio."

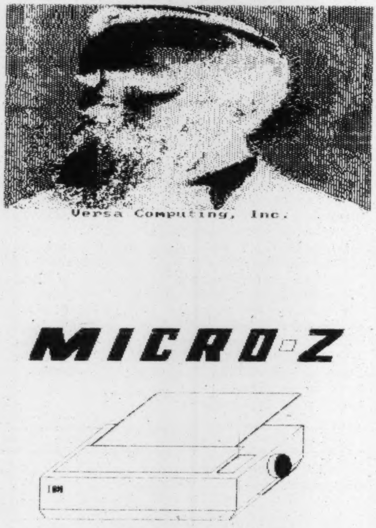


Figure 1. Two images printed by Will's program. Hayes is reversed, and somewhat squashed. The Micro-Z logo is printed as a medium resolution image, even though it was saved in high resolution.

Aspect ratio refers to the ratio of the width and height of the image. For example, suppose you drew a square, but the aspect ratio of the height to the width was 1/2. What you would see is a rectangle, half as tall as it was wide.

The problem with the printer is to get the same ratio for the printed image as is presented by the graphics display. I have completely ignored this issue in my program, and if you compare the output from my program, shown in Figure 1, with the comparable output from the commercial programs, you will see the Rutherford Hayes is squashed.

Graftrax-80

One of the things I had to do to write this program and test the four products was to add the graphics capability to my printer. Rick Thomas, of Ratcom, was nice enough to send along a Graftrax-80 kit for me to use.

I thus have the experience of installing the kit in the IBM version of the Epson, and as you can see from the figures it worked just fine. The printer must be opened, a chip removed, and the three Graftrax chips installed. Also, a wire must be cut and the printer configuration switches must be reset.

The Epson instructions were complete and mostly clear. The chips were hard to remove and insert, requiring some patience. If this doesn't sound like your cup of tea, your dealer will probably be willing to help you out.

Once installed, the printer gains not only the graphics capability but some new text functions too. For example, it is possible to embed emphasized print within a line. The standard IBM or Epson printer cannot. Graftrax also offers italics, and many other revised and improved features.

Other Graphics Dump Programs

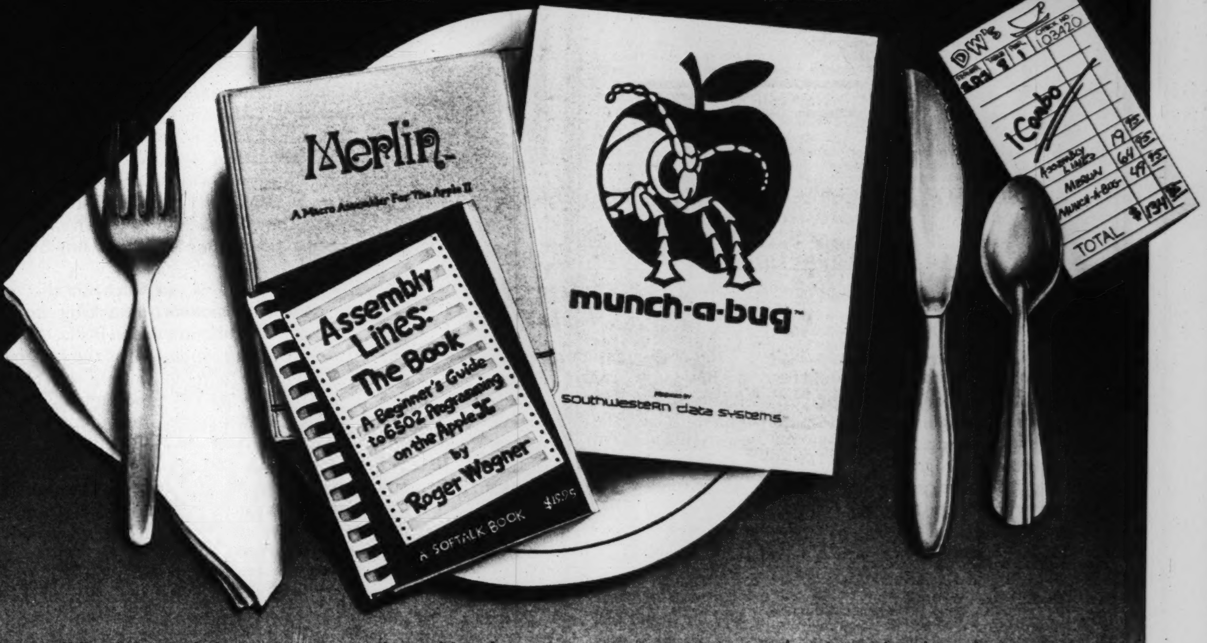
I tested four programs designed to transfer graphics images to the printer. They are *Videograph 88* from Windmill Software ($59.95), the *Graphics Hardcopy System* from Versa Computing, *PrintGraf* from Micro-Z Company ($44.50), and *RatTrax* from Ratcom, Inc. ($25). These packages share one trait in common, but are otherwise dramatically different. The common trait is speed.

The speed is achieved because the programs are not written in Basic. The code

SOUTHWESTERN DATA SYSTEMS

PROUDLY INTRODUCES ONE OF THE **TASTIEST** MACHINE LANGUAGE DEVELOPMENT SYSTEMS AVAILABLE . . .

"THE S•D•S COMBO!"



Whether you're an experienced machine language programmer, or a beginner just learning, Southwestern Data Systems now offers you some of the best programming aids available . . .

Assembly Lines: The Book

By Roger Wagner

A BEGINNER'S GUIDE TO 6502 PROGRAMMING ON THE APPLE II.

For beginners, ASSEMBLY LINES: THE BOOK provides a clear and non-technical introduction to machine language programming on the Apple. Drawn from the monthly column in Softalk Magazine, and expanded to provide even more information, ASSEMBLY LINES: THE BOOK has already received critical acclaim as the best tutorial on machine language programming available.

Example programs include, paddles, sound, disk files and more; all presented with the novice programmer in mind. The book also includes an excellent reference section listing each machine language command, and a sample listing illustrating its most common uses in actual source listing.

SUGGESTED RETAIL PRICE: $19.95

Merlin™* By Glen Bredon

A 6502 MACRO ASSEMBLER

For programmers of all skill levels, we think you'll find that MERLIN is the most powerful 6502 assembler available for the Apple, while at the same time being the easiest to use.

IN FACT, WE'RE SO CONFIDENT OF THIS CLAIM, THAT IF YOU CAN FIND A BETTER ASSEMBLER WITHIN 30 DAYS OF PURCHASE, SIMPLY RETURN THE COMPLETE MERLIN PACKAGE FOR A FULL REFUND!

A full featured macro assembler with optional assembly to disk, and use of 'include' files. Merlin's editor has word processor-like power with such options as global search/replace, a powerful line editor, and more. The package also includes SOURCEROR, a utility to generate labeled pseudo source code from raw binary files, **and also SOURCEROR .FP, a fully labeled and commented source listing of Applesoft BASIC!**

SUGGESTED RETAIL PRICE: $64.95

munch-a-bug™

By Wink Saville

A 6502 PROGRAM DE-BUGGER

To round out the set, we also highly recommend MUNCH-A-BUG. This very useful utility provides the means to trace through machine language programs one step at a time. This is very educational to the beginner, and an invaluable de-bugging aid to the advanced programmer. In addition, the same money-back guarantee applies to MUNCH-A-BUG as to MERLIN!

More than a simple step and trace utility, MUNCH-A-BUG includes its own mini-assembler, supports labels, and even conditional trace flags. This means M.A.B. can be put in a 'dormant' state, which will later 'pop-up' in the trace mode, only when certain conditions are met. Thus routines within fully operational programs can be tested right at run-time.

SUGGESTED RETAIL PRICE: $49.95

SPECIAL LIMITED TIME COMBINATION PRICE: $119.95

THIS OFFER VALID THROUGH OCTOBER 31, 1982. • CALIFORNIA RESIDENTS ADD 6% SALES TAX.

Please ask your local Apple dealer for more details, or write SDS for a sample list of MERLIN's commands and a complete product guide of over 20 other outstanding programs!

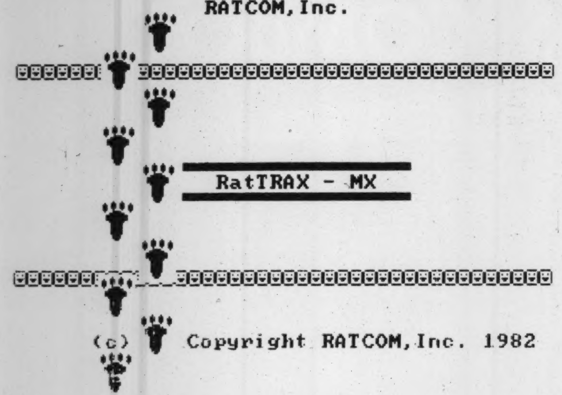
*__MERLIN__ is the assembler of choice of these leading software companies: ARTSCI, INC. • BRODERBUND SOFTWARE, INC. • GEBELLI SOFTWARE, INC. • PROMETHEUS PRODUCTS, INC. • SIRIUS SOFTWARE, INC. • SYNERGISTIC SOFTWARE.

southwestern data systems™

P.O. BOX 582 • SANTEE, CALIFORNIA 92071 • TELEPHONE: 714/562-3670

CIRCLE 270 ON READER SERVICE CARD

Figure 2. Image printed by RatTrax.



RATCOM, Inc.

RatTRAX - MX

(c) Copyright RATCOM,Inc. 1982

that actually dumps the screen is probably written in assembly language, but could be written in one of the compiled languages. Even so, all the packages have been setup so the graphics printing function can be accessed by a Basic program.

Rat Trax is the least expensive of the lot. The MX program, the heart of the system, is written in protected Basic. (A protected Basic program is one which has been saved with the "P" option. It is therefore encoded and cannot be listed or modified.)

All the images produced by *Rat Trax* are printed vertically on the screen, and the program provides both density and aspect ratio control. The sample shown in Figure 2 was printed at 960 dots per line, with each picture element represented by four dots.

Ratcom has a unique approach to documentation. A program supplied with *Rat Trax* prints two very nice looking pages which can be cut out of the piece of paper and punched to fit in IBM manuals. In fact, the pages are numbered for insertion in the Basic manual. This is very clever, and the two-page result contains all the information you need to use the system.

Rat Trax is designed for integration into a Basic program. That part is easy. Running the program is a little tricky — you must have the document nearby so you can tell which function keys do what. It was the only program of the four that did not provide menu selection or ask questions.

Figure 3 shows two images of Rutherford B. Hayes as printed by the *Graphics Hardcopy System* (GHS) from Versa Computing. *GHS* prints its images vertically on the page, and can print a full or quarter size image. I printed the two Hayes images in the 1/4 format, one with normal density and one with double density. A close examination of the image reveals that the density is a function of printing horizontally at either 480 or 960 dots per line. The resolution of the image down the page is constant.

GHS is easy to use, but the instructions must be read fully to be able to exercise the options. The instructions are not as well written as they could be, and nowhere mention what resolution image can be dumped (either, as it turns out). The program is rather poorly human engineered, because it only accepts upper case input and because incorrect responses to questions result in use of the defaults instead of issuance of an error message. A program called Showoff is included on the disk, but is not mentioned in the documentation. It displays the demonstration images supplied with *GHS;* more sample pictures were supplied with this package than any other.

VideoGraph 88, from Windmill Software, was unique in approach. The main program, VIDEO88.COM, is executed after IBM DOS is running, and "patches" the operating system to include the graphics print capability, increasing the size of DOS by 1873 bytes as a side effect. After that, a dump of the screen can be had at *any* time simply by depressing SHIFT-PrtSc.

Information is provided in the well-produced document describing how to invoke the function from Basic, another programming language, or the keyboard. All *VideoGraph 88* images are printed horizontally on the paper, and the aspect ratio for this single-sized image appears close to perfect.

Although utterly simple to use, the program has the slight disadvantage of being transient in nature. Every time you turn on your computer, you must remember to run VIDEO88 before you attempt to print pictures. If this is something you do all the time, you can certainly invoke VIDEO88 automatically with AUTOEXEC.BAT, so it is not too much of a handicap.

Two other slight problems are that the *VideoGraph 88* image is over 8″ wide, leaving very little room for margins or binding space, and that the Break key seems to be disabled by the program, making it necessary to use Alt-Ctrl-Del to stop the program once it is in progress.

The package comes with a program called DEMO88.BAS which printed the sample shown in Figure 4.

The fourth program is *Print-Graf* by Micro-Z Company. The program prints vertical or horizontal images. The documentation is excellent and very complete. Operation of the program was simple, and the human engineering was above average. Equipped with these advantages, I managed to have quite a bit of trouble.

The program displays its menus, questions, and instructions in an 80-column format, and appears to use color. I say appears because I use an old 9″ black and white television for graphics output, and I had a hard time reading some words which seemed to be displayed in reverse video but were illegible. That was compounded by the poor resolution of my TV for 80-column display. The effect was eyestrain as I tried to make out what the program was asking me. A 40-column display for this program would be a better choice.

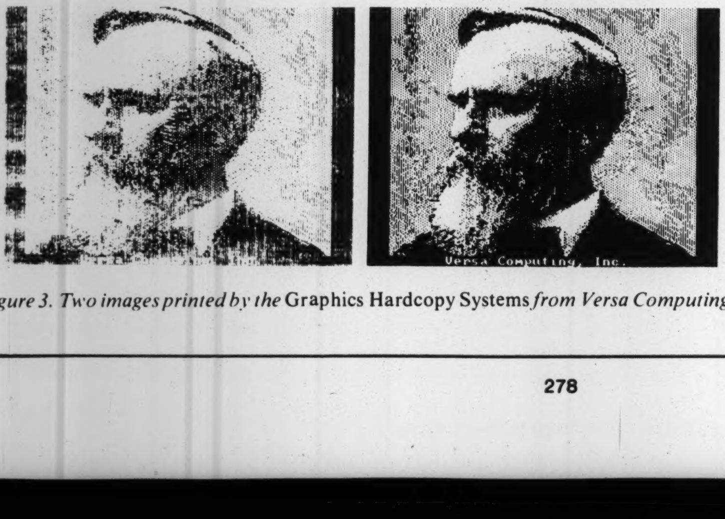
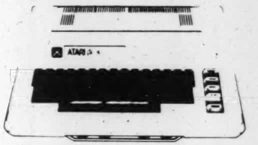

Versa Computing, Inc.

Figure 3. Two images printed by the Graphics Hardcopy Systems *from Versa Computing.*

ATARI

A Warner Communications Company



800 (16K)	$649.00
400 16K	279.00
400 YOURS to 32K or 48K	CALL
410 RECORDER	79.00
810 DISK DRIVE	449.00
850 INTERFACE	165.00
830 MODEM	149.00
825 PRINTER	575.00
481 ENTERTAINER KIT	79.00
484 COMMUNICATOR KIT	309.00
PRINTERS — Atari, Epson, Smith Corona	CALL

Prices subject to change without notice.
Shipping extra. No tax out of state.
Ca. residents add appropriate taxes.

WE ARE AN AUTHORIZED ATARI SALES AND SERVICE CENTER

COMPUTERTIME, INC.

P.O. Box 216
Kentfield, CA 94914

CALL TOLL-FREE 800-227-2520
In California 800-772-4064

For product and price list: send $2.00 for shipping.

CIRCLE 143 ON READER SERVICE CARD

MicroStand™

Standard in Microcomputing Products

AT YOUR LOCAL DEALER OR ORDER DIRECT

MS-II Let MicroStand's sturdy steel shelf organize your Apple[1] II hardware. Professionally constructed, colored and textured to match your Apple[1], and now with new ventilation slots. MicroStand will enhance your home or office microcomputing system, and is available at microcomputer stores across the nation.

CS-I Sturdy steel Apple[1] beige copy holder for ease in typing from books, magazines, etc...

MS-II	$49.95 plus $5.00 shipping and handling
CS-I	$19.95 plus $3.00 shipping and handling

MicroStand
P.O. Box 96
Tolovana Park, OR 97145
1 (503) 738-9601
1 (800) 547-2107

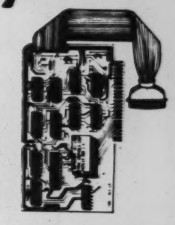
VISA MasterCard

[1] TM of Apple Computers, Inc.

CIRCLE 214 ON READER SERVICE CARD

APPLE HARDWARE 201 838-9027 NEW

THE TACKLER™



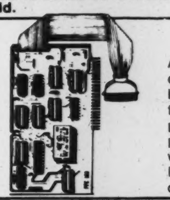
DUAL • MODE PARALLEL INTERFACE FOR THE APPLE®
2 BOARDS IN ONE FOR NO MORE COMPATIBILITY PROBLEMS!

An intelligent board to provide easy control of your printer's full potential. Plus a standard parallel board at the flip of a switch -- your assurance of compatibility with essentially all software for the APPLE®. Hires printing with simple keyboard commands that replace hard to use software routines. No disks to load. Special features include inverse, doubled, and rotated graphics and many text control features, available through easy keyboard or software commands.

It's simple to print HIRES graphics from an APPLE computer with The Tackler from TYMAC. This is the first truly universal parallel interface! Plus the ROM for your specific printer. Sophisticated intelligence when you need it, total compability that never lets you down.

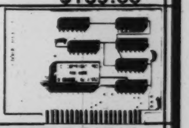
Change printers -- no need to buy another board. Just plug in one of our ROM'S and you're all set. ROM'S available for Epson, C. Itoh, NEC, and Okidata -- others available soon.

You've asked us to make the TACKLER better than the others and we did. $159.00 ✱



UPGRADEABLE PARALLEL PRINTER CARD

A Universal Centronics type parallel printer board complete with cable and connector. This unique board allows you to turn on and off the high bit so that you can access additional features in many printers. Easily upgradeable to a fully intelligent printer board with graphics and text dumps. Use with EPSON, C. ITOH, ANADEX, STAR-WRITER, NEC, OKI and others with standard Centronics configuration. **$139.00**



THE PERFORMER PRINTER FORMATTER BOARD for Epson, OKI, NEC 8023, CITOH 8510 provides resident HIRES screen dump and print formatting in firmware. Plugs into Apple slot and easy access to all printer fonts through menu with PR# command. Use with standard printer cards to add intelligence. **$49.00** specify printer.

THE MIRROR FIRMWARE FOR NOVATION APPLE CAT II®

The Data Communication Handler ROM Emulates syntax of an other popular Apple Modem product with improvements. Plugs directly on Apple CAT II Board. Supports Videx and Smarterm 80 column cards, touch tone and rotary dial, remote terminal, voice toggle, easy printer access and much more.

List $39.00 Introductory Price **$29.00**

DOUBLE DOS Plus

A piggy-back board that plugs into the disk-controller card so that you can switch select between DOS 3.2 and DOS 3.3. DOUBLE DOS Plus requires APPLE DOS ROMS. **$39.00**

Super PIX SOFTWARE

The Software package that will allow your printer to dump page 1 or page 2 of the Apple Hires screen horizontally or vertically. Use with EPSON® MX-80 with or without GRAFTRAX® Roms, MX-70 – OKI® Microline 80, 82, 83, 82A, 83A – C. ITOH® 8510 and NEC 8023A. Requires Tymac Parallel Printer Board PPC-100 . . . **$24.95.**

APPLE LINK – A versitile modem utility that provides the Apple user the ability to transfer disk files and software over the phone. Only one package needed for full transfers. Compatable with all DOS file types. **$59.00**
(requires Hayes Micro Modem)

THE APPLE CARD – Two sided 100% plastic reference card Loaded with information of interest to all Apple owners. **$3.98**

NEW FOR THE VIC 20®

The Magic Typewriter

A user friendly **WORD PROCESSOR** with full joystick control (use of joystick optional). Easy edit and string manipulation commands that follow the standard VIC 20® format. Full use of function keys for ease of use. Only **$34.95***

*Requires at least 8K RAM cartridge.

Call or write us for information on our other EXCITING ITEMS FOR THE VIC®

VISA MasterCard

MICRO-WARE DIST. INC.

P.O. BOX 113 POMPTON PLAINS, N.J. 07444

Dealer and Distributor Inquires Invited.

CIRCLE 216 ON READER SERVICE CARD

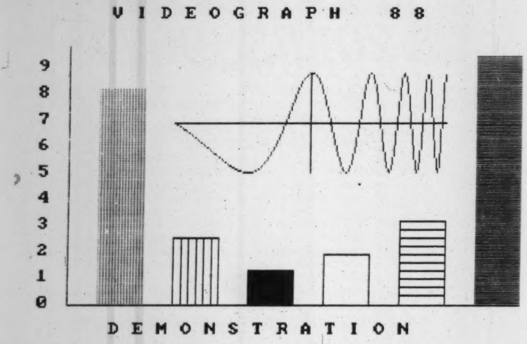


Figure 4. Output from DEMO88, a demonstration supplied with VideoGraph 88.

There are two other complaints. First the program START, which is a menu selection program, does not allow a way back to the operating system. I had to hit Alt-Ctrl-Del to get rolling again. Second, the program only allows two disk drives, which is not a major problem now, but could be in the future as you add more floppy drives or a hard disk.

The Micro-Z software includes the *Print-Graf* program and sample pictures. *Print-Graf* sells for $44.50. For $79.50 Micro-Z offers *Print-Graf* with a companion program, *Micro-Graf.* This program is a data plotting package that I think is quite good.

It allows you to enter a set of points and establish the coordinate system, then displays the data points on the graph. Once the initial data entry is complete, several options, such as a linear regression, curve-fitting, and various plotting options, become available. I particularly like the line and curve-fitting routines.

The program displays the graph, and then draws a straight or curved line to show the function which most closely matches that set of data points. The only drawback of *Micro-Graf* is that the data points cannot be saved. The displayed image can be printed or saved, but the work of entering the points is lost.

Three of the packages tested have the capability to print the image as it appears on the screen (white on black) or reversed (black on white). The default is usually reversed, because white on black seems correct for displays, but backwards for paper. *VideoGraph 88* prints only reversed images.

Aspect ratio is handled well by all the packages. The sole exception is the horizontal image produced by *Print-Graf,* which has precisely the same squashed aspect ratio as the image produced by my Basic program. If you compare the Micro-Z image in Figure 5 with the same image printed by my program (Figure 1b) you will see that they are the same size.

It is hard to call any of the four packages superior to the others. They can all do the job, and, with the exception of *VideoGraph 88,* all offer flexibility. All the programs fall in the $25 to $45 range, so there is not a great deal of price difference.

The packages impressed me evenly, and none had a significant, special characteristic or capability that would cause me to endorse it. If pushed to the wall, I think I would lean ever so lightly toward either *RatTrax* or *Print-Graf.*

IBM External Software Program

I have already reported that IBM has revised its external software submission plan. This month I received a copy of the 40-page "Software Submission Guide" which IBM has just published. It is excellent. It is well-organized and should provide answers to just about any submission question you may have.

The whole program seems *much* more reasonable. For one thing, the Submission Agreement no longer states that you are bound to enter into a contract with IBM if they accept your software. Instead, the Guide says ". . . we will offer a Software Contract which will include such items as royalties, advances, and . . ." The two key words here are "offer" and "royalties," both of which indicate that the process is now more open to negotiation.

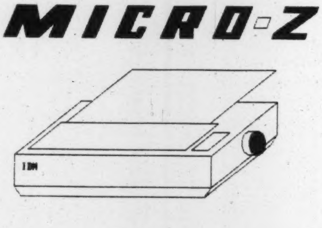


Figure 5. Image from Print-Graf. *Note the finer resolution as compared with Figure 1. Aspect ratio is not quite correct.*

None of this means that IBM will be any less careful or tough, just that they are willing to work something out. That's a step in the right direction.

New Products

Aspen Ribbons carries a broad line of printer ribbons. They offer a ribbon for the IBM 80 CPS (Epson MX-80) for $8.50, almost half of what I paid for my first replacement from IBM. Aspen will also recycle a used ribbon for $3.45. I have one of Aspen's ribbons which I will be trying this coming month.

VisiCorp has announced the *VisiFile, VisiTrend/Plot, VisiDex,* and *Desktop/Plan* programs for the IBM Personal Computer. *VisiDex* is priced at $250 and the others are $300. According to the press release, Desktop/Plan was supposed to be out in May, but I haven't seen it anywhere yet. The others are due in the third quarter of this year, which should mean by the time you read this.

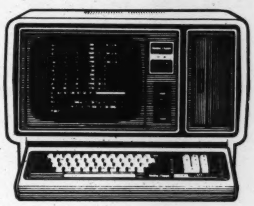
An Advanced Version of *VisiCalc* was announced for the Apple III and was demonstrated at the NCC. Naturally, I made the appropriate inquiries. I think I can say with some certainty that it will be available for the IBM, but I can't say when. New Apple III features include variable column widths, space between columns(!), more powerful replicate capabilities, on-screen help, worksheet consolidation, and greater on-screen and report formatting capabilities.

Micro Focus has announced the availability of their family of software tools, including CIS Cobol, Level II Cobol, Animator, Forms-2, and Slideshow, for the IBM Personal Computer. The Cobol compilers have been widely accepted, and the Level II Cobol compiler has recently been certified at the highest level, and with no errors, by the Federal Compiler Testing Center.

Professional Software Inc. has announced *WordPro-PC,* a new word processor for the IBM. Suggested retail is $395 for the program, apparently a spin-off from the version for Commodore computers. Professional Software claims that over 20,000 copies have been sold worldwide for Commodore systems. Availability is scheduled for September.

The Oasis-16 multi-user operating system, claimed by manufacturer Phase One Systems to be the first for the IBM PC, is now available. Phase One claims direct compatibility with the Z80-based Oasis Basic and C language applications software, making a large body of software immediately available. The system will support Corvus hard disks, and can handle from three to 32 users depending upon system configuration. Phase One offers free applications software directories for prospective OASIS-16 customers. Cost of the system is $1495.

DISCOUNT
TRS-80® COMPUTERS



Free Catalog!

Buy Direct!

- 64K Memory
- Built in 8" Disk Drive
- Detachable Keyboard

Large Inventory!

TRS-80 Supplies!

26-4002
$3288.00

Toll Free Order:
1-800-835-9056

Kansas Residents:
1-800-362-9091

Jimscot, Inc.

P.O. Box 607
1023 N. Kansas
Liberal, Ks. 67901

TRS-80 Is A Registered Trademark Of Tandy Corp.

CIRCLE 185 ON READER SERVICE CARD

Go FORTH and Prosper

With Timin FORTH, the unusually fast, elegant and versatile superset of FIG FORTH.

Lifeboat Associates offers this powerful, threaded, interpretive and structured language including a memory resident operating system, text editor, assembler and debugger. This extended FORTH is also enhanced by:

a visual screen editor with string search and replace
CP/M-80 file format compatibility
many additional FORTH words
array handling (implemented in machine code)
FORTH assembler for 8080/Z80TM machine instructions
full floating-point capability

Use this complete interactive software development system to slash software development time and shrink system memory requirements.

For more information about Timin FORTH or any of the other 200+ software packages available for use in professional, personal, and programming environments under SB-80TM or other CP/M®-80 compatible operating systems, IBM PC DOS, or MSTM-DOS (SB-86) contact:

Lifeboat Associates, 1651 Third Avenue, NY, NY 10028. (212) 860-0300. TWX: 710-581-2524 (LBSOFT NYK); Telex: 640693 (LBSOFT NYK).

SB-80, SB-86, trademarks Lifeboat Associates
MS, trademark Microsoft, Inc.
Z80, trademark Zilog, Inc.
CP/M, registered trademark Digital Research, Inc.
Copyright © 1982, by Lifeboat Associates

CIRCLE 193 ON READER SERVICE CARD

56page FREE catalog

Business Forms and Supplies for MICRO Computers

Save money. Your firm name and address printed on standardized, continuous checks, invoices, statements, letterheads and labels. Designed to work with programs from over 200 software sources . . . or program to our attractive forms yourself with guides provided. Full color catalog also has stock tab paper, envelopes, diskettes, many other supplies and accessories.

- **Quality products at low prices**
- **No "handling charges" or hidden extras**
- **Available in small quantities**
- **Money-Back Guarantee**

Fast service . . . buy direct by mail or
PHONE TOLL FREE
1 + 800-225-9550
(Mass. residents 1 + 800-922-8560)
8:00 A.M. to 5:00 P.M., ET

NAME PHONE
COMPANY
STREET
CITY, STATE and ZIP

Required to help us send you correct information:

SOFTWARE BRAND PACKAGE# ☐ Do own programming.
COMPUTER MAKE MODEL# ☐ Have not purchased yet.
YOUR LINE OF BUSINESS Number of employees.

14101

Nebs Computer Forms
12 South Street, Townsend, Massachusetts 01469
A division of New England Business Service, Inc.

CIRCLE 224 ON READER SERVICE CARD

IBM Images, continued...

Information Unlimited Software, Inc. (IUS) announced several programs for the PC. *General Ledger, Accounts Payable,* and *Accounts Receivable* head the list, which also includes *EasyPlanner,* a new spreadsheet program. Also available from IUS are *EasyWriter II,* IUS' top-of-the-line word processor, the *EasySpeller* spelling checker, and *EasyFiler,* a record management system.

Strategic Simulations has announced *The Warp Factor,* one of their most popular games, for the IBM PC. The game program costs $39.95 and requires 64K of memory. Both IBM display adapters are supported.

Finally, Software Arts, Inc., has broken the silence about their new product, which was demonstrated at the NCC. *TK!Solver* is a program used to solve scientific, engineering, and business problems without programming.

Dan Bricklin says the program will have the same kind of effect upon mathematical problem solving in technical fields as *VisiCalc* has had upon business analysis. *TK!Solver* will be available for the Apple II and IBM Personal Computers late this year. Software Arts is marketing the product themselves, and will also offer prebuilt models in many fields. Early models will include mechanical engineering, architectural design, financial analysis, and high school science.

I got a chance to see a demo of TK!Solver. I don't want to over-react before I have a chance to get my hands dirty, but the program looks great. I was very impressed by the demo. (For an in-depth evaluation of *TK!Solver,* see the November 1982 issue of *Creative Computing.*) ☐

Firms Mentioned in This Column

Software Arts, Inc.
P.O. Box 527
Cambridge, MA 02139

Microsoft Corporation
10700 Northup Way
Bellevue, WA 98004
(206) 828-8080

Information Unlimited Software, Inc.
2401 Marinship Way
Sausalito, CA 94965
(415) 525-9452

Phase One Systems, Inc.
7700 Edgewater Dr., Suite 830
Oakland, CA 94621
(415) 562-8085

Professional Software Inc.
51 Fremont St.
Needham, MA 02194
(617) 444-5224

Micro Focus
1601 Civic Center Dr.
Santa Clara, CA 95050
(408) 496-0176

VisiCorp
2895 Zanker Rd.
San Jose, CA 95134
(408) 946-9000

Aspen Ribbons, Inc.
1700 N. 55th St.
Boulder, CO 80301
(800) 525-0646

Micro-Z Electronic Systems
Box 2426
Rolling Hills, CA 90274
(213) 377-1640

Windmill Software
1058 Joan Dr.
Burlington, Ontario
Canada, L7T 3H2

Versa Computing, Inc.
3541 Old Conejo Rd., Suite 104
Newbury Park, CA 91320
(805) 498-1956

Ratcom, Inc.
7620 S.W. 147th Ct.
Miami, FL 33193
(305) 382-3947

Digital Equipment Corporation
Maynard, MA 01754
(617) 897-5111

Wang Laboratories, Inc.
One Industrial Ave.
Lowell, MA 01851
(617) 459-5000

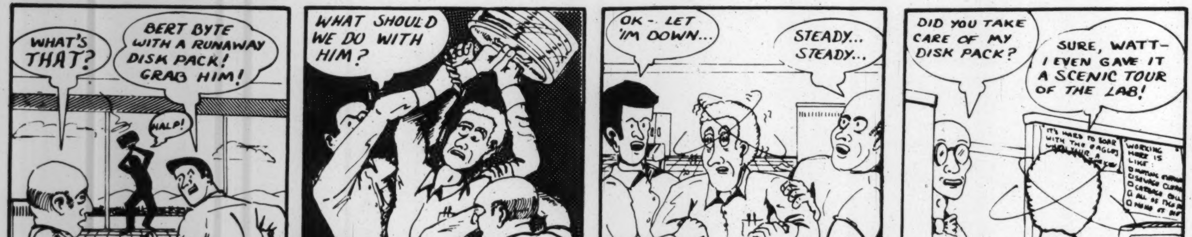
Grid Systems Corporation
2535 Garcia Ave.
Mountain View, CA 94043
(415) 961-6873

Dynalogic Info-Tech Corporation
141 Bentley Ave.
Ottawa, Canada K2E 6T7
(613) 226-1383

Strategic Simulations Inc.
465 Fairchild Dr., Suite 108
Mountain View, CA 94043
(415) 964-1353

Bit Pit

Chas Andres


WHAT'S THAT?
BERT BYTE WITH A RUNAWAY DISK PACK! GRAB HIM!
HALP!
WHAT SHOULD WE DO WITH HIM?
WE'VE GOT TO PUT IT BACK IN! WITHOUT BRAKES, IT COULD SPIN FOR HOURS!
OK - LET 'IM DOWN...
STEADY... STEADY...
DID YOU TAKE CARE OF MY DISK PACK?
SURE, WATT- I EVEN GAVE IT A SCENIC TOUR OF THE LAB!
ANDRES ©1982

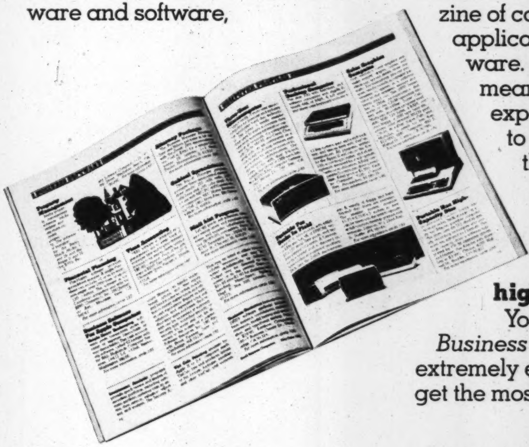
Are you getting the most from your business computer?

Get the best source of information available on microcomputer use: *Small Business Computers*

It pays to consult *Small Business Computers* before you or your company expand your software capabilities, look at new peripherals, or even consider your first office microcomputer.
Here's why:

We write only for people who are professionally involved with business microcomputer systems. You won't find any space games or home budget programs in our pages.

Instead, you *will* find feature after feature on business hardware and software, plus applications you can use right now, and later as your needs grow.



You'll also evaluate a wide range of hardware and peripherals, including video display terminals, disk storage equipment, printers (dot matrix and daisy wheel) and modems.

Every evaluation and review in *Small Business Computers* is conducted by our own panel of 21 top computer-science experts. What's more, *Small Business Computers* comes to you from the publishers of *Creative Computing*, the Number One magazine of computer applications and software. All of which means we have the expertise and resources to guarantee that you get the most authoritative, up-to-date analyses and advice available anywhere.

Cost effectiveness: high value plus low price

You can see why *Small Business Computers* will be extremely effective in helping you get the most from a business computer system. Now for the "cost" part: You can subscribe to *Small Business Computers* for as little as $14.97 and save 25% off the full 12-issue subscription rate. Or take 24 or 36 issues and save up to 35%!

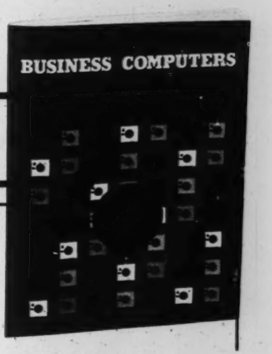
Whatever your level of involvement with business microcomputers, it makes sense to get the best source of practical information around. Why not take a moment to fill in and mail the coupon now?

SMALL BUSINESS COMPUTERS **critically reviews a variety of software packages for:**

- Accounting
- Word processing
- Data base management
- Business planning
- Financial modeling
- Spreadsheet analysis
- File and record handling

—and much more, from list management to project control.

Your subscription to *SMALL BUSINESS COMPUTERS* may be tax deductible. Check with your accountant.



SMALL BUSINESS COMPUTERS CN 1988, Morristown, New Jersey 07960

YES! Enter my subscription to **SMALL BUSINESS COMPUTERS** for:

☐ 12 issues at $14.97—I save 25%.
☐ 24 issues at $27.97—I save 30%.
☐ 36 issues at $38.97—I save 35%.

Savings based on full 12-issue subscription rate of $19.97.
Offer valid in U.S. and possessions only. Please allow 30 to 60 days for delivery of first issue.

CHECK ONE:
☐ Payment enclosed.
☐ Purchase order enclosed.
☐ Bill me later.

8H039

NAME______________________________
(please print full name)

COMPANY______________________________

ADDRESS______________________________

CITY____________ STATE________ ZIP________

rings...trs-80 strings...trs-8

Stephen B. Gray

Reaching for his .44, Jessie shot six holes in the side of the mailcar, one for each station on this month's TRS-80 track: several solutions to high-resolution graphics; the DOSPLUS alternative to TRSDOS; Radio Shack's *Time Manager* program; those old 800 customer-service numbers; the new 817 numbers; and the new Color Computer. Sorry, no room for a short program; back next month.

High Resolution

If you're into graphics at all, you're probably frustrated by the low resolution of TRS-80 black-and-white graphics, which as a consequence are very limited in the degree of detail they can provide. Lines are straight only when perfectly horizontal or vertical, circles aren't really circles, and most three-dimensional graphics are out of the question.

Most of the problem is the large size of the graphics blocks (called "pixels" in the trade, short for "picture elements"); the rest is their rectangular shape. In a space 7.5" across and 6.625" down, Radio Shack has placed 128 pixels across, and 48 down. Thus each pixel measures 0.0586 by 0.138 inch—about the size of the hole in an IBM card—giving it an aspect ratio of 3:7. A much smaller pixel, preferably a square, would be much better for graphics. However, if Radio Shack had provided more pixels, the price of a TRS-80 would be higher, and most users probably aren't interested enough in graphics to want to pay for more than the 6114 pixels they've got now.

For those who want more pixels, there are several ways to get the higher resolution. Two companies sell install-it-yourself boards, Radio Shack offers high-resolution graphics for the Model II, and as I reported in the previous column, Radio Shack will offer a similar option for the Model III later this year. I said the Model III hi-res would be available this fall, but according to the latest information, it may not be until winter. After all, *SuperScripsit* was supposed to be available by 12/30/81, according to the RSC-6 catalog; right now Fort Worth is saying June 1982. So please don't bug your dealer or Fort Worth with questions about when you'll be able to get Model III hi-res; it may be a little late.

Let's look at each of the high-resolution systems individually.

Mikeeangelo Graphic System

For $369, you can raise the resolution of your TRS-80 from the standard 128-by-48 pixels, to 384-by-192 or 191-by-192 if you have a Model I, or to 512-by-192 or 256-by-192 pixels if you have a Model III; you choose the resolution you want via software. That's up to twelve times as many pixels for a Model I, or up to sixteen times as many for a Model III.

This is done with the Mikeeangelo Graphic System, from Mikee Electronics Corp. (Box 3813, Bellevue, WA 98009), which provides 12K bytes of memory in an outboarded enclosure that connects to your TRS-80 via a ribbon cable. For the highest resolution, 512 by 192 pixels in a Model III, 98,304 bits are required, which is 12K bytes. Back in 1977, when the Model I was introduced, that 12K would probably have cost you an extra $290. Not many users would have paid that much for high resolution five years ago.

The manual provides large photographs showing exactly how to install Mikeeangelo, which involves opening the TRS-80, making 18 soldered connections and cutting one trace (or one IC pin). A magnifying glass is supplied, to make sure you leave no solder bridges, and that you've made all the right connections. You also remove the Z80 MPU and plug it into the socket on the interface board. However, unless you've had some experience in soldering IC circuits, you may not want to take a chance on making a mess of your TRS-80, although you may know somebody who can handle the job for you. There's also the problem of voiding the warranty if you (or your friend) open the TRS-80 case. Furthermore, if your TRS-80 needs repairs later, Radio Shack may first have to remove Mikeeangelo, and will charge for the removal.

A demo tape comes with Mikeeangelo and includes some plotting applications. A driver program allows you to SET, RESET or test (with POINT) every dot; LINE draws a line between any two dots. Inverse video provides black-on-white graphics (Figure 1). Through output port 254, you select normal, high or very-high resolution with or without inverse video.

Once Mikeeangelo is installed, you write programs in Basic or machine language; examples of both are provided, but not enough to really show you what the system can do.

The Mikeeangelo brochure explains why the Model III has higher resolution than the Model I: "The Model III uses an 8 x 12 character matrix instead of the 6 x 12 matrix of the Model I. If you multiply the number of dots along the top of the character cell (eight for the Model III and six for the Model I) by the number of characters per line (64), you get 512 for the Model III and 384 for the Model I. This is the number of dots along the X axis. Next, multiply the number of dots

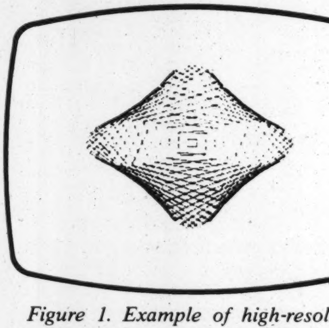


Figure 1. Example of high-resolution graphics, as drawn using the Mikeeangelo board.

UNLEASH THE BEAST IN YOUR TRS-80

With the addition of Dosplus 3.4 disk operating system, your tranquil TRS-80 becomes a wild beast.

Dosplus 3.4 can access information 5-12 times faster than the operating system you received with your TRS-80. Also, it has the uncanny ability to read 40 track disks in 80 track drives. Using Dosplus 3.4 will make your TRS-80 faster, more efficient and easier to use. Simply put, 3.4 will improve your system and increase productivity. And though 3.4 transforms your TRS-80 into a beast of a system, it remains a pussy cat to use. Giving you a higher degree of accuracy control throughout all your operations. Dosplus 3.4 comes with an easy to use operating guide so simple your mother could use it.

So release the beast in your TRS-80, use Dosplus 3.4 disk operating system for a smoother, faster, easier and more accurate way of operating. Now Dosplus 3.4 is just **$149.95.**

Call Connie Phalen Toll Free for immediate delivery **1-800-327-8724.**

MICRO SYSTEMS SOFTWARE, INC.
Specializing in the Tandy Line
4301-18 Oak Circle, Boca Raton, FL 33431

DOSPLUS

DOSPLUS first in Quality!
First in the industry!

CIRCLE 215 ON READER SERVICE CARD

along the side of the character (12) by the number of lines on the screen (16) and you get 192. This is the number of dots along the Y axis. The Model III has a resolution of 512 x 192 dots and the Model I has a resolution of 384 x 192 dots."

Although the Mikeeangelo manual doesn't give enough programming help, there's another source of software for this hi-res system.

Rescom

Bryan Mumford has come up with a number of firsts in TRS-80 software, such as the first disk-cataloging program, the first print spooler, and the first disassembling single-stepping debugger. There's another one, which I've never seen in his ads, the High Resolution Command Module, perhaps because it's very specialized: it's meant to be used with Mikeeangelo.

The first paragraph of the five-page manual for the module says, "The Mikeeangelo high-resolution interface for the TRS-80 Models I and III is a welcomed product. It is well designed and gives us excellent graphics capability. It is, however, like any high-resolution system, awkward to use without the proper software. The purpose of this *High Resolution Command Module* (hereafter called *Rescom*) is to add a group of graphics commands to the existing Basic language. There are 14 commands available, and they will greatly simplify your high-resolution programming." *Rescom* is $24.95 for either Model I or III, from Mumford Micro Systems, Box 400, Summerland, CA 93067.

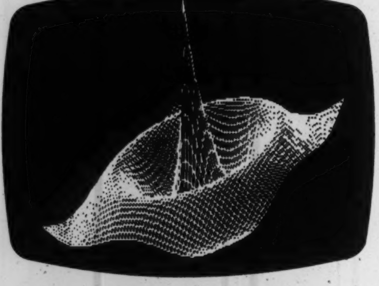


Figure 2. Hires graphics for the Model II TRS-80 provides 153,600 pixels plus eleven new graphics commands in Basic.

Included among the 14 *Rescom* commands are: clear the hi-res memory, turn on (or off) one pixel, test one pixel, draw (or erase) a line from one point to another, draw a line from the present point to the past point, print the hi-res image on an MX-100 (or an MX-80 with Graftrax), select hi-res or mid-res, select reverse (or normal) video. That's 12 of the 14; the other two are involved with displaying the hi-res memory, or making it invisible.

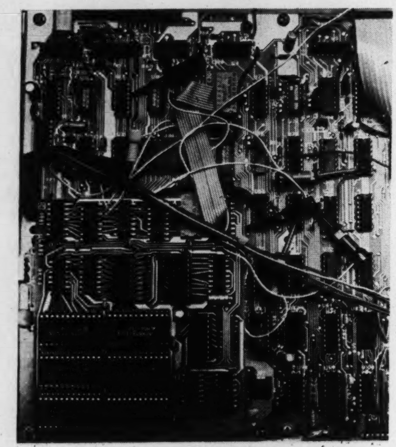


Figure 3. Seven micro-clips connect Micro-Lab's Grafyx Solution board electronically to the TRS-80 Model III's circuit board.

E/RAM

You may have seen, last year, ads for E/RAM hi-res graphics for the Model-I Level-II TRS-80, offering 256 x 192 pixels, for $350 from Vern Street Products: The Computer Store in Tulsa, OK.

Those ads disappeared, and were replaced, early this year, by ads for E/RAM for the Model II, at $495 from Keyline Computer Products (manufacturer of the $350 E/RAM), also of Tulsa. When the Model II ads also disappeared, I called The Computer Store, and was told, "The designer of the hi-res for the Model II gave up when Radio Shack came out with their own hi-res II. He's looked into hi-res for the III, but it was too difficult, no room."

Radio Shack's Model II hi-res (Figure 2), which provides 640 x 240 pixels (for $499 plus installation), is their own design, I understand, and so is the forthcoming Model III hi-res.

There's one more source of hi-res graphics for the Model III, and it requires no soldering.

Grafyx Solution

With the Grafyx Solution add-on circuit board ($299.95 from Micro-Labs Inc., 902 Pinecrest Drive, Richardson, TX 75080), you get three resolutions: high (512 x 192), medium (128 x 192) and low (128 x 96).

There is no soldering with Grafyx Solution, although you do have to cut one trace and remove two ICs from their sockets. Instead of soldering, you clip seven micro-clips onto IC pins; the seven are at the ends of wires connected to the PC board you install in your Model III's innards (Figure 3).

These clips are the "E-Z" type used to connect test instruments into densely-packed circuit boards. You press the plastic plunger, and a little hook slides out; you hook it onto an IC pin or component lead, release the plunger, and the test-lead is firmly attached, with no chance of flailing around, as can happen when hand-held test-prods slip (and sometimes zap ICs). However, you may not care for the idea of seven micro-clips dangling inside your Model III case. In one instance, the manual warns you to "be sure to keep the plastic clip away from the socketed memory in that corner since some brands of ICs get quite warm."

One more thing: you need a hacksaw. Before you install the Grafyx board, you must make room for it by removing the metal RF shield. Afterwards, you make a cut in the shield and bend back part of it a quarter of an inch, so it's out of the way of the new PC board.

Once you've installed the Grafyx Solution, which contains 12K bytes of additional read/write memory, you use the supplied software to add hi-res graphics to Basic programs (Figure 4). There are commands to enable (or turn off) the hi-res display, clear the hi-res screen without affecting the standard text characters (the hi-res graphics screen is displayed on top of the normal character display), set the desired resolution, plot a point, read point status, draw a line between two points, complement every point on the hi-res screen for an inverse display, copy the contents of the hi-res and text screen to a printer with graphics capabilities, draw a box whose diagonals ends are at two given points, draw a circle with a given radius and center, shade in the shape surrounding a point (half-shade or solid-shade), copy the contents of a screen rectangle into an array, and take the contents of the array and display it at a given position.

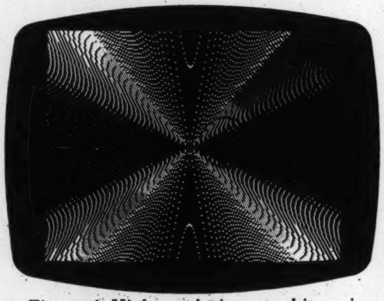


Figure 4. High-resolution graphics using Micro-Lab's Grafyx Solution; note the small size of the dot in this four-way kaleidoscope.

TRS-80® COMPUTERS

CONSUMER DISCOUNT PRICES

BUY DIRECT
PURE RADIO SHACK EQUIPMENT
LOW **DISCOUNT** PRICES

BUY DIRECT SAVE MONEY

MICRO MANAGEMENT SYSTEMS, INC.

TRS-80	DISCOUNT PRICED FROM
COLOR COMPUTER	$299
MODEL III	$609

TRS-80	DISCOUNT PRICED FROM
MODEL II	$2988
MODEL 16	$4158

We offer you the total package....................

—SATISFACTION	thousands of satisfied customers since 1978!
—PRICE	consistently offer the best value! Save money
—HONESTY	no gimmicks, no worry - mail order ease!
—INVENTORY	large, full line to assure fast delivery!
—RELIABLE PRODUCTS	backed by major Name Brand manufacturers!
—ALL U.S.A. SHIPMENTS	are fully insured against damage or loss!
—TOLL FREE PHONES	doesn't cost you a penny to call us!

CALL US TOLL FREE FOR YOUR DISCOUNT PRICES!

WRITE FOR FREE CATALOG

ATARI

TRS-80
PERSONAL COMPUTERS
PRINTERS
SOFTWARE
Smith-Corona®
DAISY WHEEL

SONY®
FRANKLIN

CENTRONICS®

commodore COMPUTER

MICRO MANAGEMENT SYSTEMS, INC.
PARCEL DIVISION - DEPT. NO. 3
2803 Thomasville Road East • Cairo, Georgia 31728
GA. & INFO 912-377-7120

All **TRS-80** Equipment is Pure Radio Shack Factory Built. Free copy of Radio Shack Warranty available upon request. TM - Tandy Corporation

ORDER TOLL FREE 1-800-841-0860

CIRCLE 210 ON READER SERVICE CARD

Design Line Micro Work Stations

RETAIL PRICE
$185

- A complete range of work stations designed specifically to house *all* micro-computers.
- Delivered heavily packed, in self-assembly form needing only a Phillips screwdriver and a few minutes of your time to assemble.
- Manufactured from 1" all wood particle board surfaced with hard-wearing melamine veneer, in either Oak or Walnut.
- Dealer and Distribution prices on request.
- For more information on our full range of work stations write or call 301-223-8900.

ATLANTIC CABINET CORPORATION
P. O. Box 100, Williamsport, Maryland 21795

CIRCLE 115 ON READER SERVICE CARD

MEMOREX FLEXIBLE DISCS

BUY 10 Get one FREE from Memorex

BOX OF 10 .... $32.50

YOUR COST $2.95 EA. 5¼" SS DD SS

BUSINESS COMPUTER PRODUCTS
6828 NE Sandy
Portland, OR 97213
287-3517
"Nations Flex Center"

MAIL ORDERS ACCEPTED
We Also Carry Tapes & Hard Disks

CIRCLE 123 ON READER SERVICE CARD

TRS-80 by Radio Shack
Model 16 2 Drive 128K $4777.
Save over $1000.
Also available new TRS-80 DMP-200, DMP-400, DWP-410 and DMP-500

Call For Prices

Price — We have the best price. Check the others, but call us.
Selection — ATARI • APPLE • TRS-80 • EPSON • OKIDATA • C. ITOH, etc.
Service — Most items in stock for immediate shipment. Call or write for Free 40 page catalog of over 600 items.

Computer Discount of America
15 Marshall Hill Road
West Milford Mall
West Milford, NJ
07480-2198
In New Jersey call
201-728-8080

CALL TOLL FREE: 800-526-5313

CIRCLE 138 ON READER SERVICE CARD

TRS-80 Strings, continued...

Eighteen demonstration programs and eight utilities are supplied, along with a program that provides an 80-character display for business forms and word processing. The manual goes into theory of operation and assembly-language techniques, and ends with a list of five graphics programs available from Micro-Labs: *Bizgraph, Draw, Mathplot, 3Dplot,* and *PCHAR* (for creating character sets). Only two are priced, at $34.95 each.

The Choice

So there you have the three choices: Mikeeangelo at $369 with a top resolution of 512 x 192, with soldering but with Rescom software; Grafyx at $300 with the same top resolution, without soldering but with micro-clips; and, later this year, Radio Shack's own hi-res offering, with an unknown price and resolution. You may want to wait to see what comes out of Fort Worth, but if you can't, you've got two ways to go.

TRSDOS

When you use a TRS-80 without disk drives, the computer is controlled by the internal ROM (read-only memory), which contains the Basic originally written by Microsoft for the TRS-80. The Basic can't be changed without switching ROMs, and anyway, Microsoft Basic is highly efficient. The highly ingenious "tight code" written by Paul Allen and Bill Gates (which was the beginning of the Microsoft empire) takes up much less memory than most (if not all) of the other Basics.

However, when you move up to Disk Basic, you get into TRSDOS, the disk operating system that performs all the housekeeping required to run the system efficiently. TRSDOS, which Radio Shack provides with TRS-80 disk systems, leaves something to be desired. Even Radio Shack has admitted it from time to time, and has had to publish several TRSDOS releases to clear up various goofs. Even then, various features that many TRS-80 owners consider important are missing from TRSDOS, and several software houses have taken advantage of the lacunae.

Three disk operating systems for the TRS-80 were reviewed back in September 1981 (p. 152): NewDOS by Apparat; TRSDOS 2.3 from Radio Shack; and VTOS, which was renamed LDOS by Lobo International. Author Stephen Kimmel noted several "shortcomings" in TRSDOS, remarking that Apparat "had a different answer that was more to my liking," and said VTOS (now LDOS) "is extremely easy to use," having a 40-page operator's guide instead of a 200-page manual. After specifying various features, Kimmel said, "It should be obvious that both VTOS 4.0 and NewDOS/80 offer significant enhancements on TRSDOS and hence offer more commands.

DOSPLUS

Another very popular TRS-80 disk operating system is *DOSPLUS*, found at computer dealers, or available from Micro-Systems Software (5846 Funston St., Hollywood, FL 33023). *DOSPLUS* 3.3, an older version I started with last year, offered these features:

- RESTORE: a KILLed file can be brought back to life with this unique utility, unless you've written over it with another file.
- DEVICE: displays on the screen all I/O devices connected to your system, and their driver addresses.
- FORMS: goes TRSDOS FORMS several better by adding a value for number of *printed* lines per page and performs top-of-form on the printer, plus several more.
- CRUNCH: compresses Basic programs by removing unnecessary blanks and remarks.
- SPOOL: permits text printing while enabling the program currently running to proceed to the next step.
- TRANSFER: moves all user files from one disk to another.
- Lower-case detection: automatically displays lower-case letters if the lower-case mod is installed (on Model I systems).
- Built-in screen printer: press two keys (S/P, SHIFT/down-arrow, or SHIFT/CLEAR, depending on model), and the information on the screen will be printed out.

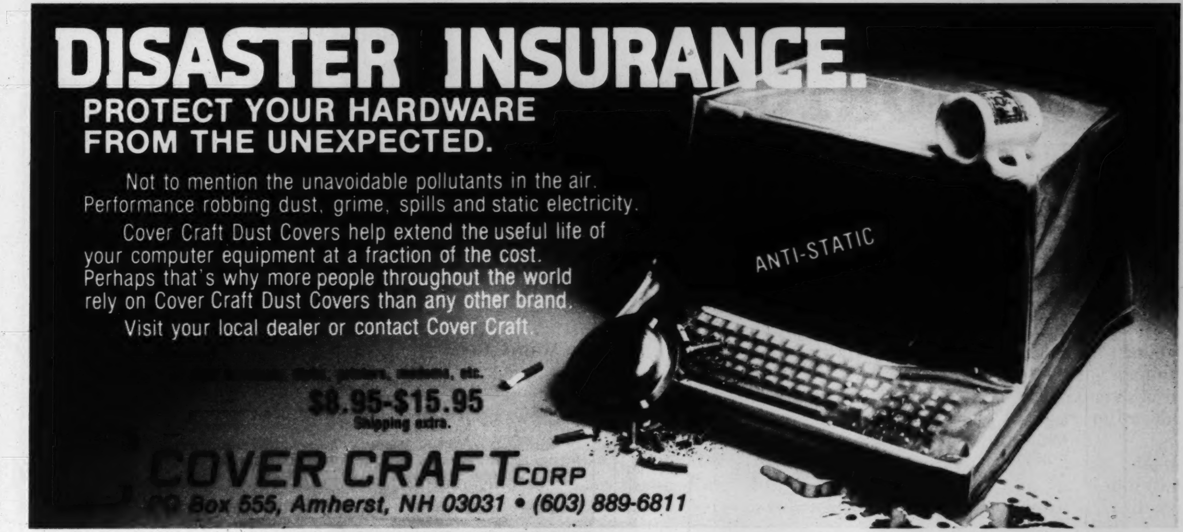
The latest version, at this writing, is DOSPLUS 3.4, which includes all the 3.3 features described, and adds a handful more, including a Basic array sort (multi-key, multi-array), random-access and ASCII modification on diskdump, and a dozen more.

DOSPLUS 3.4 is $149.95, which includes a 240-page manual; you can upgrade from 3.3 to 3.4 for $49.95.

DOSPLUS Basic

Included in DOSPLUS is Disk Basic, which, according to the 3.4 manual, is "a set of enhancements to the Model III ROM Basic, resident upon the disk. It contains features to allow input/output to disk files for data storage and will allow you to load and run Basic programs that are stored on the disk. Disk Basic is completely memory resident on the DOSPLUS system diskette, and comes in two forms—Basic and TBasic."

The DOSPLUS Basic has extended commands and DOS commands, and is less memory-efficient than TBasic (Tiny Basic), which lacks the DOSPLUS system commands and extended features such as extended error messages.



DISASTER INSURANCE.

PROTECT YOUR HARDWARE FROM THE UNEXPECTED.

Not to mention the unavoidable pollutants in the air. Performance robbing dust, grime, spills and static electricity.

Cover Craft Dust Covers help extend the useful life of your computer equipment at a fraction of the cost. Perhaps that's why more people throughout the world rely on Cover Craft Dust Covers than any other brand.

Visit your local dealer or contact Cover Craft.

[illegible] disks, printers, modems, etc.

$8.95-$15.95
Shipping extra.

COVER CRAFT CORP
PO Box 555, Amherst, NH 03031 • (603) 889-6811

CIRCLE 150 ON READER SERVICE CARD

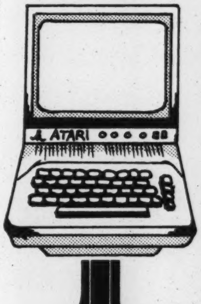
ANNOUNCING...

80 Columns for the ATARI® 800

The **FULL-VIEW 80** Display Card combines the best of two worlds — 80-column capability with normal ATARI 40-column/graphics mode. 80-column mode provides upper and lower case characters with full descenders.

Add the **32K MEMORY PLUS** with the FULL-VIEW 80 to achieve a 48K, 80-column system. The 32K MEMORY PLUS card operates with both the ATARI 400 and ATARI 800

ATARI



The ATARI FULL-VIEW 80 and 32K MEMORY PLUS join the family of APPLE products currently available from BIT 3

APPLE®

FULL-VIEW 80–

80 x 24 display for the APPLE II and APPLE II PLUS supplies upper and lower case with full descenders, line drawing graphics, and shift key detector for typewriter-like operation.

DUAL-COMM PLUS

Two independent serial I/O ports for the APPLE II combines features of APPLE High Speed Serial Card and APPLE Communications Card in one card. Baud rates range from 50 to 19,200. Great with the FULL-VIEW 80 and a modem.

MEMORY PLUS–

16K addition to increase your 48K APPLE to 64K.

Contact your ATARI or APPLE dealer or BIT 3 for more information.

ATARI PRODUCTS:

Full-View 80	$349.00
32K Memory Plus	$179.00

APPLE PRODUCTS:

Full-View 80	$295.00
Dual-Comm Plus	$239.00
Memory Plus	$149.00

ATARI is a registered trademark of ATARI, Inc.; FULL-VIEW 80 and MEMORY PLUS are registered trademarks of BIT 3; APPLE II is a registered trademark of Apple Computer, Inc.

BIT 3
COMPUTER CORPORATION

8120 Penn Avenue South, Suite 548
Minneapolis, Minnesota 55431
(612) 881-6955

MasterCard
VISA

CIRCLE 121 ON READER SERVICE CARD

How to make YOUR FORTUNE IN THE MICROCOMPUTER BUSINESS

2 informative volumes containing everything you need to know to establish and build your own profitable microcomputer business. For beginners and those already in business.

Written by a successful entrepreneur in the computer field, YOUR FORTUNE IN THE MICROCOMPUTER BUSINESS teaches you how to . . .

- make the most of a small investment.
- avoid costly business errors.
- use practical, proven methods to build your business.
- plan for growth and success.

Volume I: Getting Started includes:

- The right way to generate startup capital
- Your future in the booming software field
- How to develop a sound business plan
- The pros and cons of franchising
- Proven marketing and advertising methods
- Interviews with 6 highly-successful entrepreneurs

Plus all about becoming a highly-paid consultant . . . or starting your own manufacturing or service business.

Volume II: Growth, Survival and Success includes:

- When to incorporate, when to avoid it.
- Developing sound cash management procedures
- Headache-free employee management
- Profit during a cash crunch
- Your personal plan for consistent and steady growth
- How and when to sell your business

MONEYBACK GUARANTEE

Study and use YOUR FORTUNE IN THE MICROCOMPUTER BUSINESS for 90 days. During that time, if you wish to return these books for any reason, you may do so for a prompt and full refund.

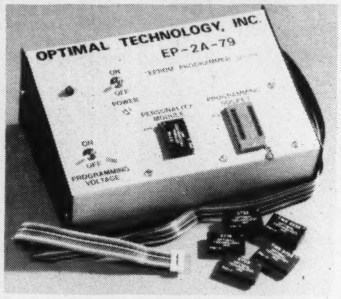
☐ I want to run my own profitable microcomputer business. Please rush me ____ copies of YOUR FORTUNE IN THE MICROCOMPUTER BUSINESS at only $15.95* each (plus $1 postage and handling).
☐ Vol I
☐ Vol II (check one)
☐ I want to save $6.95. Rush me both volumes at only $24.95* (plus $1.50 postage and handling).
Enclosed is my check or money order for ____________ I understand that if I am not satisfied for any reason, I may return them for a prompt and full refund.
*California residents please add 6% sales tax ($.96 or $1.50).

Name ______________________________
Address ______________________________
City ________________ State ________ Zip ________
☐ Enclosed is $____________ or ☐ charge my Mastercard ☐ or Visa ☐
Card No. ____________ Exp. Date ____________
Signature ______________________________

Please mail this form to Wildfire Publishing,
POB 420- FQ Carpinteria, CA 93013
Order direct by phone (805) 967-8444

CIRCLE 301 ON READER SERVICE CARD

Model EP-2A-79
EPROM Programmer



North Star
Apple
S-100
SS-50
STD-Bus
Atari
Pet
Kim-1

TRS-80
H-8
H-89
Ohio
Scientific
SWTP
Aim-65
Sym-1

Three years in the field with unsurpassed performance. Software is available for the **EP-2A-79** for most all of the microcomputers including the popular CP/M, FLEX, HDOS operating systems. Write or call for specific hardware/software interfacing. Driver packages available for F-8, 6800, 6809, 8080,8085, Z-80, 1802, 6502 and 2650 based systems.

EP-2A-79 115V 50/60 HZ $169.00

Personality Modules

PM-0	TMS 2708	$17.00	PM-5	2716, 2758	$17.00
PM-1	2704, 2708	17.00	PM-5E	2816	35.00
PM-2	2732	33.00	PM-8	MCM68764	35.00
PM-2A	2732A	33.00	PM-9	2764	35.00
PM-3	TMS 2716	17.00	SA-64-2	TMS 2564	39.00
PM-4	TMS 2532	33.00	SA-64-3	2764	39.00

Optimal Technology, Inc.

Phone (804) 973-5482
Blue Wood 127
Earlysville, VA 22936

CIRCLE 232 ON READER SERVICE CARD

---

unicomm INC.

THE PURCHASING SERVICE FOR HOME & BUSINESS COMPUTERS
18639½ VENTURA BLVD., TARZANA, CA 91356 (213) 996-5722

your ATARI connection

ATARI 800	659.00
NEC 823A	479.00
OKIDATA 82A	459.00
NEC color monitor	329.00
HAYES Smartmodem	219.00
HAYES Micromodem II	269.00
VERBATIM diskettes	26.00

add 3% shipping/handling/insurance
30 day guarantee
FREE catalog and newsletter

CIRCLE 294 ON READER SERVICE CARD

TRS-80 Strings, continued...

The advantage of TBasic is simple, according to the 3.3 manual: "In a 48K machine, after loading in DOSPLUS and TBasic, you will have just over 40K of free memory left for your program. With regular extended Basic you only have about 37K."

DOSPLUS FORMAT

After writing this column on a Model III TRS-80 under DOSPLUS, I use the FORMAT utility to set up a disk for single density, and then copy the column and also the book reviews onto this single-density disk. That's because the AlphaComp phototypesetting machine at *Creative Computing* uses output from an LNW80 computer, which is electronically identical to a TRS-80 Model I, and thus requires single-density disks. (This phototypesetting system was described in detail in March 1982, p. 200.)

Yes, TRSDOS has a FORMAT utility, but it's for double-density disks only. DOSPLUS asks, in addition to diskette name, master password, and which drive contains the disk to be formatted, two unique questions: how many tracks do you want, and do you want single or double density. That feature, without which I couldn't write this column in a format usable by *Creative Computing*, and the RESTORE utility, which brings back to life those files I didn't mean to KILL or PURGE, are alone enough to make DOSPLUS worth having. But they're only the beginning. If you use a TRS-80 more than an hour or two a week for anything other than simple programs, try DOSPLUS. You might not need the FORMAT or RESTORE commands, but there are others that are bound to be valuable.

Incidentally, if you see a list of DOSPLUS features in a Micro-Systems Software ad, many of these are identical with TRSDOS features; the list is partly meant to show how compatible DOSPLUS is with TRSDOS, usually without pointing out which is which. You'll have to compare features one by one to figure it out.

Time Manager

Radio Shack's *Time Manager* is "a personal calendar/reminder and electronic notebook," according to the RSC-7 catalog. It is designed to help you "organize your time and business information, and create permanent records." For $99.95 you can manage your time and appointments (Figure 5), and track job schedules and costs, as the catalog puts it.

Time Manager "organizes daily schedules, quickly summarizing and displaying appointments, tasks to be done, and project information. It can keep records of expenses or mileage for income-tax reports, document important dates, monitor projects and deadlines, and provide time and expense accounting information for billing or internal reports," according to the press release.

Minimum system requirements are a Model I or III with 48K memory, and two disk drives. Optional equipment recommended includes an 80-column printer, a third disk drive, and an amplifier/speaker "allowing *Time Manager* to provide audio responses."

The program is quite extensive and includes four diskettes (one with the program, one for data, and two for backups), a 76-page manual, and a reference card containing all the commands and a brief definition of each.

Calendar

First you call up a calendar by inputting the month and day. When the calendar for the month is displayed, a cursor indicates the day selected; it can be moved to any other day by using the four arrows. Using the right and left arrows, in conjunction with the shift key, moves the calendar from month to month.

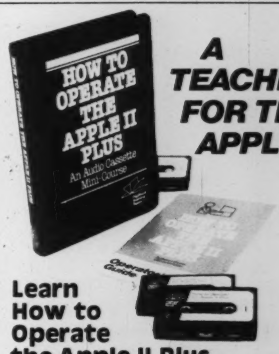
Time Manager has two levels, Month and Day. To move from the Month (the calendar display), press Enter, and the Day level appears, showing, via the sample data diskette provided, daily-agenda entries (if any) for the day selected by the cursor.

Each entry consists of four parts: priority, permanence, category, and text. Priority has five levels. Permanent entries are holidays, birthdays, etc. Any of 26 categories (A through Z) can be assigned; T is suggested for telephone calls to make, H for holidays, Y for personal items, etc.

DO NOT FOLD SPINDLE OR MUTILATE
SCHOCHET

INVESTMENT OPPORTUNITY
EXCLUSIVE FRANCHISE IN AMERICA'S MOST PROFITABLE AND DYNAMIC INDUSTRY IS BEING OFFERED FOR THE FIRST TIME IN THIS AREA. INTERNATIONAL COMPANY WILL PLACE QUALIFIED INDIVIDUAL IN "TURN KEY" BUSINESS, TRAIN KEY PEOPLE, PROVIDE INVENTORY, FINANCE YOUR CUSTOMERS, AND PAY YOU THOUSANDS OF DOLLARS "UP FRONT" ON ORDERS WHERE YOUR CUSTOMERS PAY ONLY ON FUTURE ENERGY SAVINGS. EXISTING CUSTOMERS OF OUR FRANCHISEES READS LIKE "WHO'S WHO" OF FORTUNE 500.
IF YOU QUALIFY, YOU WILL BE FLOWN TO LOS ANGELES FOR A TOUR OF INSTALLATIONS AND PERSONAL INTERVIEW. MINIMUM INVESTMENT OF $40,000 TO $100,000. CALL PRESIDENT AT 1-800-323-6556, EXT. R-137 OR WRITE: FEDERAL ENERGY SYSTEMS INC., SUITE 200, 336 N. FOOTHILL RD., BEVERLY HILLS, CALIFORNIA 90210.

CIRCLE 166 ON READER SERVICE CARD


HOW TO OPERATE THE APPLE II PLUS
An Audio Cassette Mini-Course
Operator's Guide

A TEACHER FOR THE APPLE

Learn How to Operate the Apple II Plus with the same self-study course Apple uses to train its own field sales reps. Three spoken voice cassettes and a 28-page Operator's Guide "talk you through" the practical operations of your computer: How to use each special key and essential command, run programs, enter your own data, make backup copies and much more. At last, a quick, easy, non-technical approach for the non-programmer. Satisfaction guaranteed. $49.95

Credit card orders only, call toll free
800/227-1617, Ext. 439
(In Calif., call 800/772-3545, Ext. 439)

Or send check or school P.O. to
FlipTrack Training Tapes
Dept. CT-1, P.O. Box 711
Glen Ellyn, IL 60137

Apple is a trademark of Apple Computer, Inc.

CIRCLE 168 ON READER-SERVICE CARD

EDUCATIONAL ACTIVITIES, INC.

Teacher Authored Programs
Classroom and Home
for TRS-80, APPLE II, PET

MATH • LANGUAGE ARTS
READING • SPELLING
LITERACY • PROGRAMMING

EASY TO USE
TUTORIAL & PRACTICE
USEFUL FOR ALL AGES
FULL COMPUTER CAPABILITIES
EDUCATIONALLY SOUND
REMEDIAL & DEVELOPMENTAL

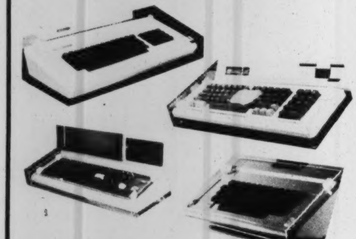
Send for FREE complete microcomputer software catalog.

EDUCATIONAL ACTIVITIES, INC.
P.O. Box 87, Baldwin, New York 11510
(516) 223-4666
CALL TOLL FREE OUTSIDE N.Y. STATE
800-645-3739
IN CANADA
CORONET INSTRUCTIONAL MEDIA, Ltd.
200 Steelcase Road East
Markham, Ontario L3R 1G2

CIRCLE 163 ON READER SERVICE CARD

PROTECT YOUR KEYBOARD WITH
PLEXA-LOK

- PLEXA-LOK slips up and over the keyboard – then gently snaps into position.
- PLEXA-LOK allows your secretary to go on break without having to worry about visitors accidentally destroying their hours (and your $) of work.



PLEXA-LOK

- **ENHANCES** looks of your system
- **PROTECTS** keyboard from dust
- **30-DAY GUARANTEE**
- **ALLOWS** computer to remain on while unattended
- **KEYBOARD** protected from kids
- **HIGH QUALITY** Acrylic
- **SCHOOLS – A MUST!**

PLEXA-LOK COVERS

APPLE II	$19.95
TRS 80 MOD III	19.95
XEROX 820	24.95
APPLE III	24.95
FROSTY APPLE	1.50 extra

CA Residents Add 6% Tax
Allow 4-6 Weeks Delivery

Dealer Inquiries Welcome

MasterCard and Visa Accepted

LE

LAST ELECTRONICS
P.O. BOX 1300
SAN ANDREAS, CA 95249
(209) 754-1800

Introductory Special – Prepaid UPS, Continental USA

CIRCLE 189 ON READER SERVICE CARD

TRS-80 Strings, continued...

The text of an entry can be up to 49 characters long.

Up to 127 entries per day can be put into *Time Manager*, although only 11 will be displayed at a time. A message appears on the bottom line of the screen to tell you how many more entries, if any, are not yet displayed for a particular day. New entries are easily made, or old ones modified.

Figure 5. Using Time Manager, this man is scheduling his appointments for next Friday, from "meet with boss at 9 AM" to "call service station."

Now that you've filled out your calendar, you may need to locate an item somewhere on it. To do this, you can select a category, or keyword, or priority, or combinations of the three. Then you can use the automatic scan, which will stop at the first day (forward or backward, as you choose) that contains the type of item you selected.

Totalling and Accounting

Time Manager can also be used for general accounting, and to provide totals for categories such as income received, hours worked and expenses, which sounds like a natural for the self-employed. Up to nine separate accounts can be maintained. Totals for each account can be obtained for a day, a month, the entire year, or any specified time period within the current year.

In the accounting display, there are columns for the account number, account description, sum, multiplier, and total. Running totals are available if desired.

Other Features

With *Time Manager* in Notepad mode, you can fill the screen with miscellaneous information, such as phone numbers, addresses, lists, reports, assignments, etc. Eight Notepad screens are available, along with a screen editor to modify and display them. Each notepad contains up to 15 lines of 64 characters each.

Two methods of printout are provided. Any of the displays can be transferred to a printer via Screen Printing. To print a Day Level display with more than 11 entries, or to print several displays, or a series of selected entries, Global Printing is available; you select start and end points.

An alarm buzzer can be sounded (if you enter the time in the opening screen) to remind you to make a phone call, for example.

Six "flags" can be set to select special features: uppercase only; expert user (suppresses error messages); etc.

The program can display any calendar page from January 1901 to December 2155, a timespan long enough to take care of the all the appointments for five or six generations. The number of days between any two dates can be calculated.

Entries may be moved from one day to another within a month, or copied from one day to another, or moved from one month to another.

TRS-80 Manager Series

There are more features, but these give you a good idea of what can be done with *Time Manager*, which is designed to "talk" to the other two programs in Radio Shack's TRS-80 Manager Series:

Personnel Manager, at $99.95, keeps track of people, by organizing employee information. Files can be searched for a specific person, product or service. Data can be organized to evaluate vendors, or employee performance.

Project Manager, also $99.95, evaluates and schedules projects, by providing TIME, TASK, PERT and GANTT charts. Projects can be viewed graphically with regard to time, sequence, personnel, materials, or resources. The effect each task has on completing the project can be shown, as well as the effects of task changes.

Dates and schedules entered on one of these three interactive manager programs can be transferred to another, updating appropriate information. All three require a 48K two-disk Model I or III; a printer is optional.

About Those 800 Numbers

You may have read, in Radio Shack's *TRS-80 Microcomputer News* for April 1982, that the toll-free 800 numbers for Computer Customer Service were discontinued on the first of June in favor of regular numbers you now have to pay for.

The reason is not because of the cost; the new system will cost Radio Shack more than the 800-number WATS lines. Every time Radio Shack put in more

JANUARY 15, 1982.

FERNANDO HERRERA

becomes the *first* person ever to win the

ATARI® STAR AWARD

His program was voted number *one!*

Now...
He proudly announces

FIRST STAR SOFTWARE

"WHEN BEING FIRST COUNTS... WE'RE NUMBER ONE"

A new software company providing innovative, quality games for the star player, retailer and distributor.

FIRST STAR SOFTWARE
22 E. 41ST STREET
NEW YORK, N.Y. 10017
(212) 532-4666

Retailer and distributor inquiries welcome.

ATARI is a registered trademark of ATARI, Inc.

ASTRO CHASE
-ultimate graphics-
available Oct. '82
THERE IS NO ESCAPE!

CIRCLE 167 ON READER SERVICE CARD

TRS-80 Strings, continued...

WATS lines, the volume of calls went up, higher and higher, and even with 57 lines there was the same long wait to talk with somebody. Many of the 800-number calls were "trash calls," from people who wanted to know if they could get a particular item at their local Radio Shack store, or some such question. The new system will hopefully eliminate most of the trash calls, and provide more time to answer "concerned calls," from people with serious questions about their TRS-80 computers.

The 800-number system was expensive, costing Radio Shack well over a million dollars a year. The new way, even though the user pays for the call, will be more expensive for Radio Shack because they've committed themselves to having about 180 people on hand to answer the calls. Radio Shack plans to put a Computer Center "in every major (and many not-so-major) markets in the country," and a Customer Service Representative in most of those Computer Centers, in the hope that users will be encouraged to contact their local service reps who can, if necessary, get help from Fort Worth at no extra cost to the user. If the system works as planned, you should be able to get help for the cost of a local call, with a minimum of delay. That is, if we all limit our calls to questions about using Radio Shack hardware and software.

Another reason for the change is that many people, and especially businessmen who own a Model II, for instance, would prefer to pay for a call to find out quickly what they want to know, rather than wait 15 or 20 minutes, or longer, on a free 800-number line for the answer.

About These 817 Numbers

Just in case you didn't see the May 1982 issue of the *TRS-80 Microcomputer News*, Radio Shack has assigned area 817 numbers to seven main groups of customer-support personnel:

- (817) 870-2041—ModelI/III Business
- (817) 870-2042—Model II/16 Business
- (817) 870-2044—Languages and Compilers
- (817) 870-2150—Color Pocket Computer
- (817) 870-2571—Hardware and Communications
- (817) 390-3302—Educational Software
- (817) 870-2271—Games, Books and New Products

These numbers, which became effective on or before June 1, 1982, are to be called between 8:00 a.m. and 5:00 p.m. (Central Time) if, as the *Microcomputer News* puts it, "you elect to call us instead of your local Radio Shack Computer Center Customer Service Representative."

The Navy might abbreviate that to COMCENCUSSERREP, which makes more sense than COCESUSER.

Remember, if we use these seven numbers only when our problems can't be solved by our local Radio Shack store, Computer Department, or Computer Center, the waiting time for help on an 817 line will be kept to a minimum.

New Color Computer

By now you know that the rumors about Radio Shack dropping the Color Computer were only half true. When they recently cut the price of the 4K Color Computer to $299 from $399, it was a preliminary to offering the 16K version for $399.95. Selling a 16K Color Computer for only 95 cents more than the 4K model will, of course, kill sales of the 4K version.

The switch is to bring the Color Computer in line with the competition, such as the $100 Timex/Sinclair 1000 (only 2K, but the price is right), and the 5K VIC-20 and 16K TI 99/4A (both selling for less than $300). ☐

Version 4.0

The Ultimate APPLE® Utility Program

COPY II PLUS

Now you can back up your protected software. Copy II Plus is the most sophisticated bit copy program available. It handles synchronized tracks, half tracks, nibble counting, bit insertion and other protection schemes. It also includes a comprehensive discussion of disk format and protection techniques, and instructions on how to back-up dozens of popular programs. A disk system and speed check assure your drives are running in top condition and a nibble editor will allow you to repair damaged diskettes, analyze protection schemes, etc.

The last DOS utility disk you will need. Fully menu driven, the Copy II Plus utilities include a catalog display with binary file addresses and lengths, a disk usage map, and the ability to verify and compare files for differences. It can copy, lock, unlock and delete files and DOS can be copied, or removed from a disk to free up space. You can change the greeting program on a DOS disk, or initialize a disk from scratch. The Copy II Plus sector editor will allow you to view and modify data in either hex or ASCII format.

For your convenience, Copy II Plus is not copy protected for backup.
Available at fine computer and software stores or direct from:

CENTRAL POINT
Software, Inc.

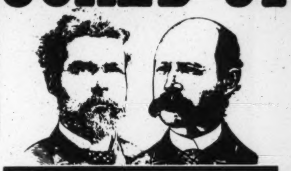
P.O. Box 19730-203
Portland, OR 97219
(503) 244-5782

$39.95

Attention current Copy II Plus owners: Return your original disk with $19.95 for an update to Version 4.0.

CIRCLE 128 ON READER SERVICE CARD

DON'T BUY SOFTWARE THAT'S LOCKED UP!



Beagle Bros MICRO SOFTWARE

All Beagle Bros Apple Utilities are BACKUP-ABLE, LISTABLE, CUSTOMIZABLE and fully compatible with normal Apple DOS.

APPLE MECHANIC
SHAPE WRITER/ZAP UTILITY
by Bert Kersey

SHAPE EDITOR: Add professional hi-res animation to your programs. Design shapes & custom type characters, automatically written into shape tables. Many type fonts on disk & listable demo programs showing how to use shape tables for games & impressive hi-res CHARTS & GRAPHS. A valuable time-saving utility and Apple learning tool.

BYTE ZAP: A MUST utility. Rewrite any byte on a disk. Optional Hex/Decimal/Ascii display and input. Create illegal file names. Restore deleted files. Inspect, repair and protect disks. Change DOS. Clear illustrated instructions show how data is stored and how to access it.

MORE: A disk PACKED with useful music, text & hi-res tricks for use in YOUR PROGRAMS.

$29.50 Includes Apple Tip Book #5 and Peeks & Pokes Chart

UTILITY CITY
21 UTILITIES ON ONE DISK
by Bert Kersey

LIST FORMATTER makes custom listings with page breaks; each statement on new line, if-then's called out and loops indented. MULTI-COLUMN CATALOG in any page-width. Put invisible commands in programs. Alphabetize & store info. Make trick & invisible file names. Append programs. Convert hex. Dump text to printer. Auto-post Run Number/Date in programs...More: 21 LISTABLE PROGRAMS Total!

$29.50 Includes Apple Tip Book #3 and Peeks & Pokes Chart

DOS BOSS
DISK COMMAND EDITOR
by Bert Kersey & Jack Cassidy

A classic utility you will ENJOY. Rename commands/error messages. PROTECT PROGRAMS (unauthorized save-attempt produces "Not Copyable" message). LIST-PREVENTION too. One-key program-run from catalog. Change Disk Volume heading to your title with or without volume number. Fascinating documentation. Hours of good reading & experiments.

All changes may be appended to your programs, so that anyone using your disks (booted or not) will be using DOS the way YOU formatted it.

$24.00 Includes Apple Tip Book #2 and Peeks & Pokes Chart

TIP DISK #1

100 programs from Beagle Bros Tip Books 1, 2, 3 & 4— Hi-Res/Lo-Res/Text/Sound. All listable, copyable and changeable; each teaches another fascinating Apple programming trick!

(Note: No Tip Book with Tip Disk #1)

$20.00 With Peeks & Pokes Chart

ALPHA PLOT
HI-RES GRAPHICS/TEXT UTILITY
by Bert Kersey & Jack Cassidy

HI-RES DRAWING: Create pictures and charts on both hi-res pages; all appendable to YOUR PROGRAMS. Relocate any portion of a picture. Compress hi-res; store images in 1/3 DISK SPACE. Superimpose images too.

HI-RES TEXT: Upper/lower case with descenders. PROPORTIONAL SPACING. No tab limitations. Adjustable letter height, spacing & color. Multi-directional typing for graphs.

$39.50 Includes Apple Tip Book #4 and Peeks & Pokes Chart

GOTO your Apple Dealer.

Most Apple Dealers carry our software. If yours doesn't, he can have it in his store for you within just a few days through **Beagle Bros** or **Softsel.**

Or Order by Phone:

24-hour **TOLL-FREE** Order Desk:
Visa/MasterCard/COD* Orders, call
Nationwide: **800-854-2003** ext.827
California: **800-522-1500** ext.827
Alaska/Hawaii: **800-854-2622** ext.827
(ORDERS ONLY PLEASE) *COD, add $3.00.

VISA

master charge

EACH DISK Includes: Our famous 11x17 PEEKS & POKES Chart and a different Apple Tip Book, each one a Gold Mine of juicy Apple info!

Or Mail us a check:
(or Visa/MC No. & Exp. Date)

☐ **Alpha Plot**
☐ **Dos Boss**
☐ **Tip Disk**
☐ **Utility City**
☐ **Apple Mechanic**
☐ **Game Pack 1-4**

Add $1.50 shipping (on any size order) and 6% tax if California. MAIL TO—

BEAGLE BROS, Dept.C
4315 Sierra Vista
San Diego, Ca 92103

Please add $4.00 if outside North America.

CIRCLE 119 ON READER SERVICE CARD

INTRODUCING WATSON™

NOW THE INSPECTOR HAS AN ASSISTANT™

CIRCLE 258 ON READER SERVICE CARD

Teamed up inside your Apple,™ Watson adds new features that give you complete access to everything you ever wanted to know about memory and disks.

Recover blown disks, fix catalog entries, display and delete control characters, repair bad data files even on disks with non-normal DOS. Search forward and backwards in memory, edit in HEX, ASCII, NEGATIVE ASCII and LOWER CASE. Scan disks forward and backwards, follow files forward and backwards in track/sector list on either 13- or 16-sector disks. Lockout sectors on Track Bit Map, reconstruct VTOC, find and display all Track/Sector Lists, display map of Sectors used on disk, read Nibbles track-by-track. Disassemble with ASCII displayed, kill inverse and flashing characters, verify and compare disks and display differences, read and write directly to disks. Alter DOS to display control characters in inverse, and dump the screen to a printer with a CTRL-Z, even from within BASIC. There's more but we're running out of space. Oh well, you get the idea.

Eprom or disk versions are always at your fingertips. Watson (requires The Inspector), $49.95. The Inspector, $59.95. At your local dealer or direct. MasterCard and Visa holders order toll-free, or return the coupon.

1-800-835-2246

OMEGA MICROWARE, INC.

222 So. Riverside Plaza
Chicago, IL 60606
312-648-4844

Send me
☐ The Inspector @ $59.95
☐ Watson @ $49.95
Check or money order enclosed.
System description:
Apple II ☐ Apple II + ☐ Integer Card ☐ 16K Ram Card ☐

name ____________________
address ____________________
city ____________________
state, zip ____________________

© 1982 Omega MicroWare, Inc
Apple is a registered trademark of Apple Computer, Inc.

CIRCLE 258 ON READER SERVICE CARD

THE BIG WHOOPS!

A Cosmocomical Theory of Creation

Peter Payack

Since earliest human times, one of the great unsolved mysteries is the nature and origin of the universe. Now, scientists have put forward a bold new theory which elucidates not only the intricate web of the cosmic-evolutionary scenario but also gives meaning to the enigmatic happenings of everyday life. It links together through computer aided mathematical models, such seemingly unrelated phenomena as black holes and holes in swiss cheese, gravity, condominium and energy conversion, death, the theory of evolution and the birth of Richard Nixon, quasars, and why both half-baked cakes and fully-baked civilizations fall.

The "BIG WHOOPS!" theory, as this daring new cosmological conception is called, contends that every object in the universe has a built-in *whoops!* factor that leads to its eventual downfall in an incongruous, if not downright silly, way. According to the theory, this is an inherent component of reality's basic nature which can not be altered in any way. It explains why, when things seem to be going along smoothly, *whoops!*, something happens that messes everything up. Say, an almost inconceivable giant red star, some 500 million kilometers in diameter, farcically collapses into a tiny white dwarf, not more than 20 kilometers across. Or, you are on your way to a close friend's funeral when you slip on a banana peel and rip your meticulously pressed pants. That's the *whoops!* factor at work.

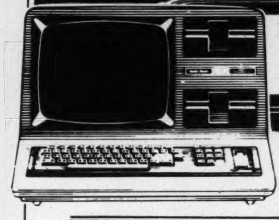
Further, it is postulated that the more massive the material object, the larger and sillier is its potential *whoops!* Therefore, if we were to extrapolate back some 20 billion years to a time when all the matter of the universe was concentrated into a highly compressed primordial globule, you can readily see that it exploded and formed today's observable cosmos because of the *whoops!* factor at its absolute best!

This cosmocomical event can best be visualized by picturing in your mind this preposterous primeval atom as a cosmogonical whoopee cushion which is being blown-up for a party gag. After it has been properly inflated and placed on a chair (preferably under a pillow) one of the unsuspecting guests "sits on it," and in a manner of speaking, lets the air out of the archetypal bag! Only in this singular case the air happens to be loaded with galaxies, pulsars, planets, stars, nebulae, comets, black holes, meteors, quarks and quasars that go hurling into all directions of space, and the universe is brought into being. Who blew it up, and who or what "sat on it" has not been addressed by these scientists who feel that these questions should be left to the realm of philosophical and theological inquiry.

The observations that led to the theoretical foundations of this theory were done at the Mt. Maldermer Observatory, in California, with the aid of its newly constructed 2.50-inch kaleidoscope. □

Peter Payack, 64 Highland Avenue, Cambridge, MA 02139.

DISCOUNT



TRS-80®

TRS-80 MODEL III

$1950 48-K 26-1066

$819 16-K 26-1062

TRS-80 MODEL II

64-K 26-4002 **$3000**

TRS-80 MODEL 16

128-K 26-6002 **$4825**

TRS-80 8.4 MEGABYTE HARD DISKS (PRIMARY UNIT) . . . $4000.

TRS-80 COLOR **$309** 16-K 26-3004 **$425** 16-K 26-3002 **$525** 32-K 26-3003

WE HAVE COLOR DISK DRIVES 0 — **$475** 1-2-3 — **$315**

WE ALSO CARRY EPSON AND OKIDATA PRINTERS, XEROX 820 AND ALTOS COMPUTERS.
NO OUT-OF-STATE TAXES. T.M. TANDY CORP.

Sold with the manufacturer's limited warranty. Copies of such warranty may be obtained for review from Perry Oil and Gas Co.

PERRY OIL & GAS INC.

Dept. No. H-8 137 NORTH MAIN ST., PERRY, MICHIGAN 48872
PHONE (517) 625-4161, MICH

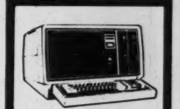
WE ACCEPT CERTIFIED CHECKS, CASHIERS CHECKS AND MONEY ORDERS.

FOR OUR PRICES, PLEASE CALL TOLL FREE
1-800-248-3823

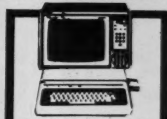
CIRCLE 236 ON READER SERVICE CARD

From Computer Plus to YOU . . .

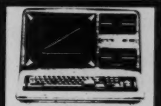
PLUS after PLUS after PLUS



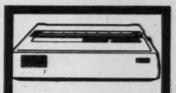
Model 16 128K
1 Drive $4199
2 Drive $4799



Color Computer 16K $305
w/16K Ext. Basic $399
w/32K Ext. Basic $499

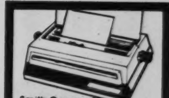


Model III 16K $799
Model III 48K
2 Disk & RS232 c $1949



Okidata 82A $425

Color Computer Disk Drive
Drive 0 $470 Drive 1 $315



Smith Corona TPI
Daisy Wheel $599

BUY DIRECT

Here are just a few of our fine offers . . . call TOLL FREE for full information.

COMPUTERS	
Model II 64K	$3100
Model III 4K LEV I	599
MODEL III 16K	799
MODEL III 32K	856.50
*MODEL III 32K	831.50
MODEL III 48K	914
*MODEL III 48K	864
Model III 48K 2 Disk & RS232 c	1949
†Model III 48K 2 Disk No RS232 c	1749
Color Computer 16K	305
Color Computer 16K w/extended basic	399
Color Computer 32K w/extended basic	499
‡Color Computer 32K-64K w/extended basic	510
Pocket Computer 2	230
Model 16 1DR 128K	4199
Model 16 2DR 128K	4799
DT-1 Data Terminal	599
MODEMS	
Lynx Direct Connect MI/MIII	235
Hayes Smart Modem II	235
Telephone Interface II	169
R.S. Modem I D.C.	130
R.S. Modem II D.C.	210
PRINTERS	
Daisy Wheel II	1715
Smith Corona TPI Daisy Wheel	599
Epson MX80	599
Epson MX80 FT	549
Epson MX100	735
Line Printer VII	249
Line Printer VIII	599
Line Printer V	1610
Microline 80	325
Microline 82A	425
Microline 83A	699
Microline 84 Parallel	1090
P. C. Plotter Printer	199
DISK DRIVES	
R.S. Model III 1ST-Drive	679
Tandon 40 Track MI	289
Color Computer Drive 1	315
Color Computer Drive 0	470
Primary Hard Disk	3999
ETC.	
Verbatum 5" Double Density	32
8" Double Density Double Sided Diskettes	49.95
Ctr-80A recorder	52
C. C Joysticks	22
16K RAM N.E.C. 200 N.S. chips	25
64K Ram Chips	75
Color Computer Flex D.O.S.	99
R.S. Software 10% off list	

*Computer Plus New Equipment with NEC RAM installed 180 Day Computer Plus Warranty

†MIII R.S. Drive 0 Tandon Drive 1

‡Color Computer 64K requires Disk 0 and Flex D.O.S.

call TOLL FREE 1-800-343-8124

We have the lowest possible Fully Warranteed Prices AND a full complement of Radio Shack Software.

computer plus

480 King Street
Littleton, MA 01460
617-486-3193

Write for your free catalog

Prices subject to change without notice
Not responsible for typographical errors
TRS-80 is a registered trademark of Tandy Corp

CIRCLE 141 ON READER SERVICE CARD

Lyco Computer

Marketing & Consultants

ATARI®

800 48K . . . . . $ 699
400 16K . . . . . $ 288

825 PRINTER	$585	810 DRIVE	449
410 RECORDER	$75	830 MODEM	$159
32K RAM	$89	850 INTERFACE	$164
4022 PAC MAN	$35	KRAZY SHOOTOUT	$35
4011 STAR RAIDERS	$32	EASTERN FRONT 41	$25
4012 MISSILE COMMAND	$29	CENTIPEDE	$35
4008 SPACE INVADERS	$29	JOYSTICKS	$18
4013 ASTEROIDS	$29	4018 PILOT HOME	$65
4006 SUPER BREAKOUT	$29	MICROSOFT BASIC	$69
8130 CAVERNS OF MARS	$33	PERSONAL FINANCE	$62

FREE COMMODORE VIC-20 PRODUCT CATALOG

VIC-20 . . . $ 239

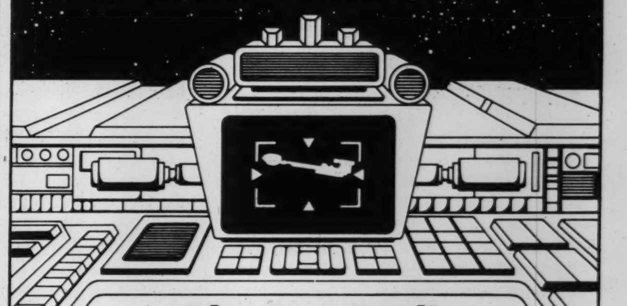
TO ORDER
CALL TOLL FREE
800-233-8760
In PA 1-717-398-4079

LYCO COMPUTERS
P.O. BOX 10
COGAN STATION, PA
17728

FREE ATARI CA[illegible]OG OF THIRD PARTY SOFTWA[illegible] PREPAID ORDERS SHIPPED [illegible]REE ALLOW PERSONAL CHECKS 4 WKS TO CLEAR ADD 3% FOR VISA OR MASTER CARD NO SALES TAX EXCEPT PA RESIDENTS ALL MERCHANDISE FULLY GUARANTEED PRICES SUBJECT TO CHANGE

CIRCLE 196 ON READER SERVICE CARD

STARSHIP COMMANDER



Take Command!

- 41 Major Commands to manage the crew, maintain power, maneuver, make repairs, fire weapons, communicate.
- 30 Hi-Resolution color displays, including 3-D.
- 7 Stations – Engineering, Science, Weapons, Defense, Communications, Life Support, Navigation.
- 120 Crew Members and Officers, assignable by name.
- Send messages to the enemy – and receive messages back.
- Manual, Semi, or Automatic Systems Control.
- Current game can be saved.

48K Apple II DOS 3.3 with paddles. On sale at your local computer store or send check for $39.95 to:

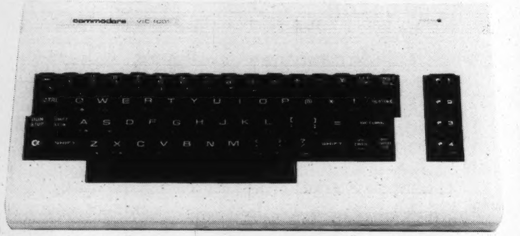
VOYAGER SOFTWARE · P.O. BOX 1126 · BURLINGAME, CA 94010

Allow 21 days for delivery. California residents add 6½% sales tax.

CIRCLE 298 ON READER SERVICE CARD

Personal Electronic Transactions

32K
commodore
PET
professional computer



I am happy to hear from you, and encourage your correspondence, I will try to acknowledge all correspondence, and a SASE makes things easier for both of us. Please send your letters to "Personal Electronic Transactions" c/o PO Box 354, Palo Alto, CA 94301.

Greg Yob

Voila! The "Star" System

I was looking over the stack of items for review in this column and noticed that some of them are getting a bit old—I haven't enough space to give each item the kind of review I would like to do and have any room for the other items and small programs that I know you appreciate.

The "star" system is rather popular for rating restaurants, movies and tourist attractions: zero stars means the show isn't worth considering, one or two stars indicate that the product is reasonable but nothing special, three stars means good, four, quite good and five stars is superb. So from now on I will take less space for description and use the stars to give you my overall impression of a reviewed item. You can check the advertisements or write the manufacturer if you want more details.

While we are at this, note that *Creative Computing* has a *Software Buyer's Guide* which covers quite a few products and is worth reading.

PetChess *****

If you have been reading this magazine during the past two years, you know that David Levy wrote a column on computer games and how to program them, particularly games requiring some skill and thought to play. Mr. Levy went further and helped produce *PetChess* which is by far the finest chess program for the PET I have seen. I expect it will stand up rather well in the microcomputer chess tournaments.

PetChess from ACT Ltd. comes as a set of two tapes which hold versions for Basic 1.0, Basic 2.0/Revision 3.0, Basic 4.0 and the 8032 models of the PET. You will need a full 32K machine to load *PetChess*. Once started, *PetChess* draws a chessboard and the men, and awaits your commands. The instruction book is clear and concise and includes the FIDE Laws of Chess followed by the program.

All of the features you would expect of a chess program are present. This includes the entry of moves, the placement of pieces for problem solving, backing up if you blunder, displaying the square numbers, and setting playing level. An especially nice feature is the *H which displays the list of available commands at any point in the game. The 8032 version also displays the previous 20 moves at the right of the board for your reference.

PetChess is excellent for the amateur player—so get it! I do have some "wish for" items for the chess buff. They include: storage of the game or board position to the disk for later recall, a chess clock for timed games, and a dump of the current game to the printer.

I am a moderately good chess player, but PetChess can beat me consistently at Level 4, and unlike many chess games, it does quite well in the endgame where some deeper looking ahead is needed. When you first start, use Level 0 or 1 which plays very aggressively but with no foresight. Then work up to the level that suits you. *PetChess* is a very fast player—Level 4 takes about 30 seconds per move. It sells for about $50.

If you write software, take a good long look at *PetChess*. Sometimes a program can be written for the user rather than the programmer; *PetChess* is a good example.

PET Nuke Fix

Donald Barker reports that the PET Nuke program has a WAIT statement which prevents PET Nuke from working on the Basic 2.0/Revision 3.0 and 8032 machines. The offending line is:

```
5311 WAIT 59410,4,4:POKE216,23:
PRINT:PRINT BL$;:GETZZ$:RETURN
```

Mr. Barker provides this fix:

```
Delete 5311
5320 GET ZZ$:
IF ZZ$="" THEN 5320
5325 POKE 216,23:PRINT:
PRINT BL$;
5330 RETURN
```

I do not use the WAIT statement, because the PET will not respond to the Stop key while doing the WAIT statement. If the desired event does not happen, the PET remains stuck in the WAIT state.

If you have Basic 2.0/Revision 3.0, try exploring the results of WAIT 6502,n where n is from 0 to 255. This is for Basic 2.0/Revision 3.0 owners only.

CP/M for the PET *****

The universe of Commodore computers is rather like a ghetto in that we tend not to notice what is going on with other personal computers. The Apple and

Move up to Microsystems

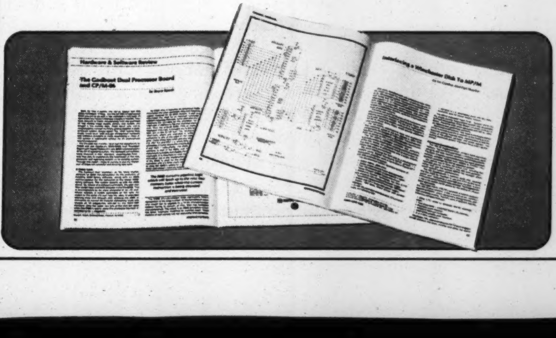
THE JOURNAL FOR SOPHISTICATED MICROCOMPUTER USERS.

Microsystems is not, in any sense, for beginners. Unlike "personal computer" magazines, *Microsystems* is written *exclusively* for expert users and designers in the software and support hardware field.

If you need a reliable, high-level, up-to-date journal devoted to CP/M,® MP/M,® MS-DOS,™ UNIX,® XENIX,™ OASIS and other operating systems, then *Microsystems* is for you. We feature tutorials on the modification and special use of systems, offer short-cut routines, show you debugging procedures, techniques for interfacing, and much more. Our one purpose is to keep the advanced microcomputer professional at the leading edge of DOS development and use.

In a few recent issues of Microsystems you would have seen:

- Reviews of four C compilers: BDS C, Small C, tiny c TWO™ and Whitesmiths C.
- A programming style comparison: Digital Research PL/I-80™ vs. Microsoft BASIC.
- Twenty-seven 16-Bit DOS compared.
- Virtual segment procedures under UCSD Pascal.
- An in-depth look at MP/M-80 II.™
- A simple 6-byte hexadecimal ASCII conversion routine.
- Using CP/M's undocumented "Autoload" feature.
- An explanation of double density disk controllers.



- A comparison of five popular S-100 disk controller cards.
- OS-1—a UNIX-like DOS with a CP/M adapter.

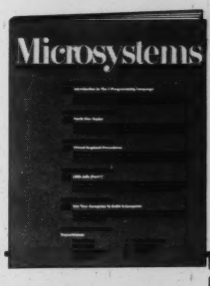
Every issue of *Microsystems* keeps you at the forefront of the industry in customizing software and adapting hardware to meet new requirements and standards. You'll also find industry news, book and new product reviews, plus our regular *Software Directory* listing newly available programs.

To get the high-level systems information you want, join the club of serious microcomputer professionals who subscribe to *Microsystems*. Use the coupon below to order, and save up to 33%!

PROFESSIONALS PLEASE NOTE:

Your subscription to Microsystems may be tax deductible. Check with your accountant.

Trademarks:
XENIX: Microsoft; tiny c TWO: tiny c assoc.; PL/I-80, MS-DOS, MP/M-80 II: Digital Research.
Registered Trademarks:
CP/M, MP/M: Digital Research; UNIX: Bell Laboratories.



Microsystems CN 1987
Morristown, New Jersey 07960

YES, enter my subscription to *Microsystems* for:

☐ 12 issues at $19.97—I save 20%.
☐ 24 issues at $36.97—I save 26%.
☐ 36 issues at $49.97—I save 33%.

Savings based on full 12-issue subscription price of $24.97.

Mr.
Ms. 8H021
(please print full name)

Company

Address

City

State Zip

CHECK ONE: ☐ Payment enclosed. ☐ Bill me later.

Offer valid in U.S. and possessions only. Please allow 30 to 60 days for delivery of first issue. Satisfaction guaranteed or a prompt refund for unmailed issues.

NEW SUBSCRIBERS ONLY

Atari are rather like distant cousins, and who ever heard of the Z-80?

There is an enormous world of machines and software for the 8080 and Z-80 processors, and most of it uses the operating system known as CP/M. The only practical way to get a PET or other 6502 based machine to run 8080 code is to get an 8080 or Z-80 and attach it to the PET. The Softcard by Microsoft does the trick for Apples by hooking a Z-80 into the Apple bus. There is a catch with this for PET owners, however: most CP/M applications demand at least 48K of RAM.

Small Systems Engineering has built the Softbox which is a unit about the size of a large textbook (it fits nicely on top of your disk drives with room to spare for the ventilation holes in the top of the case) which contains a Z-80 processor running at 4MHz, 60K of RAM, 4K of ROM (which holds the CP/M BIOS), an IEEE 488 bus port, an RS-232 port and a Corvus hard disk port.

To use the Softbox, you simply plug it in to the IEEE 488 bus, insert the CP/M system disk and do the usual DLOAD "*". A program is loaded from the disk into the PET which then activates the Softbox. The usual CP/M prompts appear on the screen, and the CP/M world is open for your pleasure. The Softbox actually does all the CP/M computations while the PET serves as a terminal.

SSE has about 25 of the standard CP/M software packages, including Wordstar and DBase, available on PET disks at present. Since several CP/M bulletin boards are now offering CP/M software via the telephone lines, the use of a modem lets you obtain some 3000 public domain programs for your Softbox.

As with all CP/M systems, the main problem is to get a diskette in the format you can use. The Softbox uses the Commodore disks with a modified format. You can backup the diskettes, but otherwise you must run CP/M to change the contents of the disks. SSE of course provides the master diskette for the packages they sell in PET format, so you are limited to their selection and prices at present. I expect this situation will change rather rapidly.

SSE has written a rather concise and clear introductory manual to help you get started with CP/M. There are several books which go further into CP/M and an incredible amount on CP/M in publications such as *Microsystems* and *Datacast*. The Softbox, which costs $895, carries my highest approval.

VIC Bits

I have a few letters inquiring about VIC Basic. The best way to look at a VIC is to see it as a Basic 2.0/Revision 3.0 PET with a rather funny screen and memory map. I suggest that all VIC owners get some of the manuals for the PET such as the Osborne book, *PET/CBM Personal Computer Guide*. If you skip entirely the material on disks and Basic 4.0, what remains will help you quite a bit with your VIC.

The VIC disk drive arrived on my desk a while ago, and I am rapidly discovering that the VIC disk is identical in operation to a Basic 2.0/Revision 3.0 PET operating a 4040 disk drive sans a drive number. For example, if you want to get the disk catalog, you enter: LOAD "$0",8. The PET/4040 owner would have entered LOAD "$",8 where the 0 refers to the drive #0. If you have the VIC disk, locate a 4040 drive owner who has Basic 2.0/Revision 3.0 in his PET and ask questions.

In many ways the VIC situation today is identical to the PET situation about two or three years ago. I suggest that you look at back issues of PET newsletters and personal computing magazines circa 1979 to 1981. Much of the material you find will apply to the VIC. My June '82 column compares Basic 4.0 to IEEE 488 commands for PET disks. The IEEE 488 commands will work on your VIC, so take a look.

When the PET disks first arrived, the complaints about the oddness and tediousness of the disk commands were loud and frequent. As the VIC disk becomes popular, I expect the same hue and cry will arise. Eventually the "DOS Support" (or *Wedge*) came along to make life bearable, and *Disk-O-Pro* finally provided the Basic 4.0 commands for us hapless 2.0/Revision 3.0 owners. A cartridge with the *Wedge* of VIC-O-Pro is a very sensible idea. Will somebody please make it? Your product will get an immediate review.

The Single Disk Glitch

If you have the 2031 single disk drive and a Basic 2.0/Revision 3.0 machine, you may have found a bug in your Basic 2.0/Revision 3.0 ROMs. When you read a file from the disk, some of the characters will be missing. The exact reason for this is obscure and beyond the scope of this column. Willi Kusche has provided these patches:

```
4C ED FF EA
AD 40 E8 29 FB 8D 40 E8
A9 5F 4C 87 F1
```

The catch, of course, is that these patches are in your ROM, so you must make an EPROM to replace your $FOOO ROM. Willi will provide a ROM for $15. If you prefer, Skyles Electric Works will also provide this ROM for $50.

DiscSavers ***

Isn't it annoying when a friend hands you a diskette with good programs on it, but without that protective paper envelope? Or perhaps you bought a box of discount diskettes which came sans jackets?

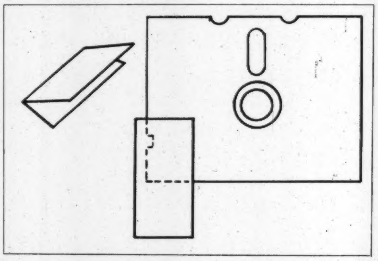
RockRoy offers colored vinyl disk sleeves to protect and help you keep your disk collection in order for about $.60 per sleeve. The colors are red, green, yellow, and blue.

Since RockRoy is the manufacturer, ask your dealer to place an order for you. You can buy boxes of 12 in each color or "assorted" which is three each of the four colors for $6.29. My *** rating means that the DiscSaver is a good product, but not an exciting one.

A Write Protect Trick

If you have the 2020 or 4040 disks, or the 8050 with the Tandon drives (These look like the Shugarts used on the 2020 and 4040) there is a simple trick to temporarily write-protect an often used diskette. Take a 3x5 card and fold it in half lengthwise. Then put your diskette in the fold as shown in Figure 1 and put the whole works into the disk drive. Your disk is now write protected while you do copy or backup operations. Take care to not let the card go more than about 3/4" past the write enable slot, and don't try a larger card which may cover the hole used to detect the rotation of the disk.

Figure 1. Folding a 3 x 5 card to write-protect a diskette.



Fold the 3 x 5 card lengthwise as shown and put the diskette into the folded part of the card. Insert the works into the disk drive. Be sure the card does not cover the index hole.

Asteroidz and Munchman *

Guess which two popular arcade games these two from ComputerMat are modeled after. You get one guess. Both of these programs run on an 8K PET (both ROMs) and are simplified versions of the arcade games Asteroids and Pac-Man. In one sense it is quite a challenge to fit a good representation of an arcade game in an 8K PET, but to do a good job you

CREATIVE COMPUTING PRESENTS...

COMPUTER BOOKS!

Basic Computer Games

A complete anthology of 101 favorite games and simulations, each complete with sample runs, program listings and description. All games run in standard Microsoft Basic and are easy to use with any computer. There are games just for fun, to develop logic strategies, to teach environmental solutions, to simulate athletic competition, to play alone or with a group. Edited by David Ahl with illustrations by George Beker. Large format paperbound, 200 pages.

#6C....**Basic Computer Games**. . $7.95 ($1.50)

BASIC
MICROCOMPUTER EDITION
COMPUTER
101 Great Games to Play on Your Home Computer By yourself or with others. Each complete with programming and sample run. Edited by David H. Ahl

More Basic Computer Games

Here are 84 new Microsoft Basic games to challenge you! Includes program listings, sample runs, and a Basic conversion table to make these games easy to use on any computer. Edited by David Ahl and Steve North, illustrated by George Beker. Large format paperbound, 200 pages.

#6C2....**More Basic Computer Games**. $7.95 ($1.50)
#6C4....**More Basic Computer Games/ TRS-80**. $7.95 ($1.50)

Computers for Kids

An easy-to-understand, step-by-step approach to programming for kids. Everything from what a computer is and how to create a flowchart to writing simple games and drawing pictures that move. Also a section of helpful hints for parents and teachers, and detailed lesson ideas. An excellent elementary introduction. By Sally Greenwood Larsen. Large format paperbound.

COMPUTERS FOR KIDS
SALLY GREENWOOD LARSEN

#12G....**Computers for Kids/Apple** $3.95 ($1)
#12H....**Computers for Kids/TRS-80** $3.95 ($1)
#12J....**Computers for Kids/Atari** .. $3.95 ($1)
#12S....**Computers for Kids/Sinclair** $3.95 ($1)

Computers in Mathematics

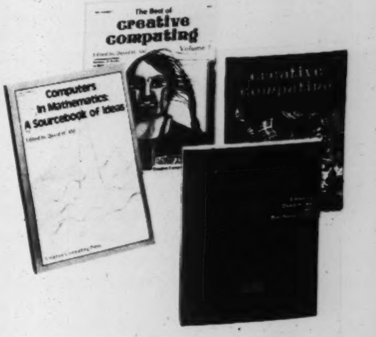
Whatever grade you teach, you'll find plenty of ways to approach mathematical concepts in *Computers in Mathematics*. Here are 134 articles and applications written for *Creative Computing* by math teachers. Flowcharts, programs, and sample runs. Over 250 problems, puzzles and programming ideas on everything from simple binary counting to multiple regression analysis and differential equations. 224 pages, large-format paperbound book.

#12D....**Computers in Mathematics**. $15.95 ($2)

The Best of Creative Computing

Articles, learning activities, fiction, games, programs, reviews, cartoons and puzzles from *Creative Computing*. Volume 1 includes computer applications in education and recreation. Volume 2 includes languages, programming theory and artificial intelligence. Volume 3 includes features on technology, public access, medical applications and computers in music. 300+ pages per volume.

#6A....**Vol. 1, Best of Creative Computing**. $8.95 ($2)
#6B....**Vol. 2, Best of Creative Computing**. $8.95 ($2)
#12C....**Vol. 3, Best of Creative Computing**. $8.95 ($2)


The Best of creative computing
Volume 1
Computers in Mathematics: A Sourcebook of Ideas
creative computing

creative computing Dept. C021 • 39 E. Hanover Avenue • Morris Plains, NJ 07950

Please send me the following books:

Book Number	Quantity	Title	Price Each	Total Price

Add postage and handling figures in parentheses ( ) following item price. Outside U.S.A., add $3.00 per order.

Subtotal* $	
Postage and Handling $	
Total $	

☐ **Payment enclosed** $ ______________
*(NJ Residents add 5% sales tax.)

☐ **Charge my:** ☐ American Express ☐ MasterCard ☐ Visa
(Charge and phone orders: $10 minimum.)

Card No. ______________ Exp. Date ______

Signature ______________

Mr./Mrs./Ms. ______________
(please print full name)

Address ______________

City/State/Zip ______________

CHARGE ORDERS: For your convenience, **PHONE TOLL FREE: 800-631-8112.** (In NJ only, 201-540-0445.)

must write the entire thing in machine language.

Asteroidz is better than *Munchman* both in speed and responsiveness. It also has several levels of play with the novice level quite easy to master. It took me some time to clear the screen at the expert level. The asteroids do not make smaller ones. Instead, they get smaller as your shots knock off chunks of them (breakout and asteroids?). One flaw is that your shots slow down the action, and if you have several shots on the screen, their range is quite short. Once the screen is cleared, the game is over.

Munchman is written entirely in Basic and is quite slow as a result. I never was able to clear the board, though I did get close. The drawback will be especially discouraging to novice players. The board does not have the "pass thru" found in Pac-Man and I noticed that the direction keys were ignored at times, so I got eaten even though my finger was on the correct key.

Winning these games is a challenge in its own right, but don't expect the kind of action you find at the arcades. I also wished for a joystick option on the user port, as many of my mistakes consisted of pressing the wrong key—my attention is on the screen, not the keyboard. Asteroidz and Munchman sell for $12.95 each.

Pakjana ***

I first noticed *Pakjana* in an article on "Object Languages" such as Smalltalk and Logo. A property of these languages is that you can easily define new procedures which immediately become part of the language. To solve a problem, you build a series of procedures which can be executed simply by typing their names. Then you combine these into other procedures and eventually you have constructed a special language of your own from these building blocks.

Pakjana draws a dancer which you can command to perform different actions, on the PET screen. For example, if you type UP, Pakjana (The dancer's name) will move up one step. UP 3 moves him up three lines. Nine kinds of faces can be selected by HEAD n, for example, HEAD 8 will make Pakjana smile. Similar commands exist for arm and leg movements.

The fun begins when you start joining commands together. REPEAT lets you repeat a sequence of actions such as REPEAT 3 (UP 2 LEFT 4) which makes the sequence in parentheses happen three times. A more powerful command is TO which lets you define a sequence as a new command in *Pakjana*. For example, you can set TO WAVE as LEFTARM 3 LEFTARM 4, and WAVE will then be a command like any of the others. WAVE 3 will wave the arm three times.

Some simple utility functions such as LIST and EDIT provide a minimal means for looking at and modifying commands. You can TAPESAVE your work for later TAPELOAD. HELP summarizes the commands available other than the ones you have defined.

I like *Pakjana* very much. It is a good way to introduce newcomers and children to computer language. Alas, a few bugs prevent me from assigning four or five stars. One of the faces, HEAD 3, leaves the nose at the edge of Pakjana's face; when another face is selected, Pakjana has two noses.

The face and arm commands do not provide symmetrical sets of right and left positions. For example, HEAD 3 looks to the dancer's right but there isn't a similar look to the dancer's left. RIGHTARM 7 is not the mirror of LEFTARM 7.

The most annoying bug is that *Pakjana* requires at least two dances to be performed before you can TAPESAVE your work. If these problems were fixed, I would give *Pakjana* a four-star rating.

Since I usually use the disk, I made the modifications in Figure 2 to use DISKSAVE and DISKLOAD instead of TAPESAVE and TAPELOAD. If you get *Pakjana* and make some improvements, I would like to see them. If you aren't afraid of a few bugs, get this program.

Pakjana, which costs $2.50, comes with a program listing, an introductory manual that kids can use and several pages which describe the operation of the program. Bill Finzer would like to see this program on other small computers, and so would I.

Filemaster ***

If you have owned a disk drive for more than six months, you know what happens to disks: they collect programs. Whatever method you use to keep the programs in order will soon cease to apply when you are in a hurry and save a program on the first disk that comes to hand. Inevitably the day comes when a cleanup job must be done.

The PET COPY command is then your workhorse, but it is clumsy to use and requires much typing. This is where *Filemaster* from Software by Sasso shines. When you load *Filemaster*, it starts up automatically. (This neat trick involves saving the program via the monitor with some values on the stack which when loaded fool the PET into thinking it is running the program.) You then insert your source disk in drive #0 and the recipient disk into drive #1. The directory is read and several options are presented. You may select the files to be copied from the directory on the screen.

The complete directory is shown, including scratched and botched files. *Filemaster* will attempt to restore damaged files and will let you unscratch a file if it is still intact on the disk. A bad file will be read until it can't be read further, and then placed in a sequential file for your further manipulations.

I have found *Filemaster* rather handy when I have to reorganize my disk collection, and I expect that you will too. *Filemaster* is a good utility and a bargain at $30.

A Yeech Program

If you have the Fat-40 or 8032 Pet, and want to bug somebody, try this little gem:

```
10 REM IRRITATION
20 FOR J=1 TO 255
30 POKE 231,J
40 PRINT CHR$(7);
50 NEXT
```

The function of location 231 will become painfully apparent in a few seconds. Variations on this theme are:

```
30 POKE 231, 255*RND(J)
30 POKE 231, J*RND(1)
```

```
12824 DATA DISKSAVE,/,DISKLOAD,/,TO,/,END,/,EDIT,/

7085 DK$="0:"+TK$+",W"
7090 OPEN 1,8,3,DK$
7091 CR$=CHR$(13)
7095 PRINT#1,RR;CR$;
7110 PRINT#1,R$(R);CR$;
7115 PRINT#1,CC%(R);CR$;
7130 PRINT#1,CM$(CP,R);CR$;

7190 CLOSE1:P$="FINISHED DISK SAVE":GOSUB2200:TM=1;GOSUB9600;RETURN

7217 DK$="0:"+TK$+",R"
7220 OPEN 1,8,3,DK$:GOSUB4400

10115 PRINT"rvs DISKSAVE .
10120 PRINT"rvs DISKLOAD
```

Figure 2. Modifications to Pakjana for disk.

Firms Mentioned In This Column

ACT (Microsoft) Ltd.
ACT House
111 Hagley Rd.
Edgbaston, Birmingham
England B16 8LB

Small Systems Engineering
222 B View St.
Mountain View, CA 94041

Willi Kusche
Wilserv Industries
P.O. Box 456
Bellmawr, NJ 08031

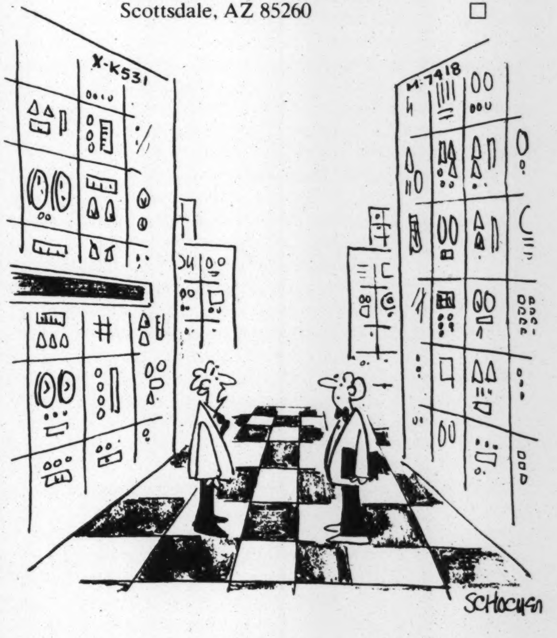
Skyles Electric Works
231-E South Whisman Rd.
Mountain View, CA 94041

ComputerMat
Box 1664
Lake Havasu City, AZ 86403

Bill Finzer
Center for Mathematical Literacy
San Francisco State University
1600 Holloway
San Francisco, CA 94132

Software by Sasso
P.O. Box 969
Laguna Beach, CA 92651

RockRoy
7721 East Gray Rd., Suite 103
Scottsdale, AZ 85260 ☐



"They had a disagreement, now they're no longer exchanging data."

METATEXT!

from Metaresearch, Inc.
More software for your hard dollar.

Completely Hardware-Free
APPLE II
TEXT PROCESSING
METATEXT DISC and
40-page Manual ..... *Only* $79.00

- Pure-software serial printer output
- Full ASCII 80-character CRT
- Ability to mix alphanumerics/graphics
- Text editor - similar to UNIX™ 'ED'
- Documentation & demonstration programs

ORDER FROM YOUR DEALER OR DIRECTLY FROM METARESEARCH, INC.

Metaresearch, Inc.
1100 S.E. Woodward St.
Portland, Oregon 97202
(503) 232-1712

MasterCard VISA
Add $1.50 Shipping

CIRCLE 202 ON READER SERVICE CARD

Disk-O-Tier
STORES & PROTECTS 11 DISKETTES

Disk-O-Tier organizes and protects diskettes close at hand, and in minimum space. Convenient, upright storage avoids "wipe-outs" caused by scratches, coffee spills, and cigarette ashes; plus, titles are easy to read.

Disk-O-Tier is molded of smoked, sturdy NAS plastic and safely files eleven 5¼" or 8" diskettes, in or out of jackets.

Priced at $9.50 each, include $2.00 postage or $19.00 for twin-pack which includes postage. Ohio orders add 5½%. Check or Money Order please. Non-U.S. orders add $5.00.

ETS Center
Dept.20 Box 651, 35026-A, Turtle Trail
Willoughby, OH 44094 • (216) 946-8479

CIRCLE 165 ON READER SERVICE CARD

AUTHORIZED
SERVICE

Now you can get **FACTORY AUTHORIZED** service for your Commodore or Atari computer and peripherals at reasonable cost. Minimize your down time frustration and expense. Extended warranty available for most products, too!

Micro Computer Service Center

CALL **717-327-1450**
477 E. Third St., Williamsport, PA 17701

CIRCLE 205 ON READER SERVICE CARD

TERMINALS FROM TRANSNET

PURCHASE PLAN • 12-24 MONTH FULL OWNERSHIP PLAN • 36 MONTH LEASE PLAN

	DESCRIPTION	PURCHASE PRICE	PER MONTH 12 MOS	24 MOS	36 MOS
*DEC	LA34 DECwriter IV Forms Ctrl.	$1,095	$105	$ 58	$ 40
	LA100 Letter Printer RO	1,995	190	106	72
	LA120 DECwriter III KSR	2,295	220	122	83
	LA120 DECwriter III RO	2,095	200	112	75
	LA12A Portable DECwriter	2,950	280	155	106
	VT100 CRT DECscope	1,695	162	90	61
	VT101 CRT DECscope	1,195	115	67	43
	VT125 CRT Graphics	3,295	315	185	119
	VT131 CRT DECscope	1,745	167	93	63
	VT132 CRT DECscope	1,995	190	106	72
	VT18XAC Personal Computer Option	2,395	230	128	86
TEXAS INSTRUMENTS	TI745 Portable Terminal	1,595	153	85	58
	TI765 Bubble Memory Terminal	2,595	249	138	93
	TI940 CRT	1,795	173	96	65
	TI785 Portable KSR, 120 CPS	1,795	173	96	65
	TI787 Portable KSR, 120 CPS	2,195	211	117	80
	TI810 RO Printer	1,695	162	90	61
	TI820 KSR Printer	2,195	211	117	80
LEAR SIEGLER	ADM3A CRT Terminal	595	57	34	22
	ADM5 CRT Terminal	645	62	36	24
	ADM32 CRT Terminal	1,165	112	65	42
C-ITOH	CIT-101 CRT	1,525	147	82	55
	CIT-161 Color CRT	2,675	257	143	97
	CIT-427 Color Graphic CRT	3,095	297	165	112
TELEVIDEO	910 CRT Terminal	650	62	36	24
	925 CRT Terminal	850	82	46	31
	950 CRT Terminal	1,075	103	57	39
NEC SPINWRITER	Letter Quality, 7715 RO	2,695	259	144	98
	Letter Quality, 7725 KSR	3,195	307	171	115
GENERAL ELECTRIC	2030 KSR Printer 30 CPS	1,195	115	67	43
	2120 KSR Printer 120 CPS	2,195	211	117	80
EPSON	MX-80 F/T Printer	745	71	42	27
	MX-100 Printer	895	86	48	32
TIMEPLEX	E0400 4 Channel Stat Mux	1,525	147	82	55
	E0800 8 Channel Stat Mux	2,050	197	110	74

*DEC is the trademark of Digital Equipment Corporation

FULL OWNERSHIP AFTER 12 OR 24 MONTHS • 10% PURCHASE OPTION AFTER 36 MONTHS

MICROCOMPUTERS
APPLE • COMMODORE • HP87 • DEC

ACCESSORIES AND PERIPHERAL EQUIPMENT
ACOUSTIC COUPLERS • MODEMS • THERMAL PAPER • RIBBONS • INTERFACE MODULES • FLOPPY DISK UNITS

TRANSNET CORPORATION
1945 ROUTE 22 • UNION, N.J. 07083 • (201) 688-7800
TWX 710-985-5485 800-526-4965 OUTSIDE N.J.

CIRCLE 310 ON READER SERVICE CARD

iews...book r

Steve Gray, et al.

Practical Guide to Computers in Education, by Coburn, Kelman, Roberts, Snyder, Watt and Weiner. Addison-Wesley Publishing Co., 266 pages. 1982.

This book, written by a group of computer educators, is aimed at school administrators, teachers and parents with an interest in the potential and the limitations of working with computers and children.

Practical Guide to Computers in Education is a clearly written work and an excellent resource for people just starting out on the quest for straight information about educational computing. From the onset, the style of the book encourages the reader to relax because, even though computers can be overwhelming, the authors are knowledgeable, experienced and committed to making the journey pleasant.

The book provides a concise and well-organized forum which covers practical as well as philosophical questions relating to computers in schools. It discusses broad ranging questions such as: Is computer education a fad? How will computers transform schools and the way students learn? Will computers widen the schism between the haves and the have nots? Also included are more pragmatic questions such as: What do you want to do with the computer? Which computer should you buy? And how will you know a good educational software package from a poor one? These points and others are all crucial in the overall decision to include computers in a school.

The authors, all affiliated with a non-profit educational organization called Intentional Educations, Inc. are not a bunch of banner waving computer fanatics who, in their haste to proselytize, gloss over important issues and philosophical considerations. Neither does the reader get the impression that they are convinced that computers are the panacea for the American educational system. Instead, *Practical Guide to Computers in Education* offers a balanced view of educational computing.

The presentation of an objective viewpoint is critical during a time when schools are under pressure to continue high standards of education in spite of drastically shrinking budgets. Through the effective use of true life vignettes, the reader is permitted to peek into several schools where community pressure forced administrators to jump blindly on the computer bandwagon only to find that in some cases not only weren't all their problems solved when the computer arrived, but many new ones were created.

One thing that would improve an otherwise fine book has to do with its extremely undramatic visual presentation. At first glance it really doesn't appear to be a very exciting book and because of this, some of the people who could most benefit from the contents might not bother to read it. Perhaps some monochromatic highlighting or some more original photographs and illustrations would give the potential reader a better idea of the high level at which this book is written.

Dramatic pizazz not withstanding, *Practical Guide to Computers in Education* is a realistic look at what can and cannot be done with computers in schools. It should be required reading for anyone who finds himself as part of the decision making process to purchase computers. The authors have been through it all themselves and leave the reader with this pearl of wisdom: "Listen very carefully and don't believe everything you hear."—*Annie Fox*

Basic Basic—English Dictionary for the Apple, PET, and TRS-80, by Larry Noonan. Dilithium Press, Beaverton, OR. 153 pages, paperback $10.95. 1982.

This is a great idea, a book to help people translate Basic programs written for a computer other than their own. The idea is quite simple (although writing the book involved an incredible amount of attention to detail): an alphabetic listing of all the commonly used Basic commands, showing how to implement each command for the three computers involved.

The author wrote the book because all three computers are used in his school in Canada, and after a while, "It became obvious that there was a need for something that would help students, teachers and other computer users recognize the similarities and differences among the three Basic languages used by these computers," the introduction says.

Part I is a dictionary of commands, functions, statements and operators used in the three Basic dialects. For example, under CHR$, we're told that this function is used only in Applesoft (not Integer Basic) but that it can be simulated by creating a string with all the ASCII characters, and an example is given. CHR$ is used in PET Basic, and reference is made to "Appendix A for special ASCII characters to be used with CHR$ on the PET." As for the TRS-80, CHR$ "is used only in Level II Basic," and details on this usage are given.

Some statements can't be translated, of course; this includes Apple's FLASH command, which to put on the TRS-80 requires adding program lines to make the display switch back and forth from white-on-black to black-on-white.

Part II is a ten-page summary of terms, in table form, "for quick reference when more detailed information is not needed." Five appendixes supply ASCII codes, abbreviations of Basic words, details on the three graphics systems, reserved words, and Boolean operators.

If you're interested in translating programs from one of these three computers to one of the others, get this book.

Understanding Your VIC, Volume I: Basic Programming, by David Schultz. Total Information Services, Inc., Box 921, Los Alamos, NM 87544. 146 pages, paperback $11.95 (plus $2 for first-class shipping and handling). 1981.

More accurately, this is a book about programming the Commodore VIC-20. The preface says it "is intended to supplement the reference manuals provided by Commodore" and "is not a Basic programming guide, but rather a tutorial presentation of how Basic works on the VIC." Hmmm; a fine distinction.

3D Graphics
from Metaresearch, Inc.
More software for your hard dollar.

'3DRB' Disc
for **APPLE II** $59.00

- Arbitrary 3-Dimensional Hi-Res Rotations
- Full ASCII Graph Labeling for Hi-Res
- Stereo Red/Blue 3-D Animation Games, Experiments

'VGR.1' Cassette
for **VIC-20** $29.00

- Full Screen 44x48 Color Graphics
- Capability for putting English Labels on Graphs
- Stereo Red/Blue 3-D Experimenter's Programs

BOTH PACKAGES COME WITH MANUAL, BEGINNER'S PRIMER AND A PAIR OF RED/BLUE STEREOSCOPIC GLASSES.

Metaresearch, Inc.
1100 S.E. Woodward St.
Portland, Oregon 97202
(503) 232-1712

MasterCard VISA
Add $1.50 Shipping

CIRCLE 203 ON READER SERVICE CARD

PEEK & POKE
Software

☆ ATARI	List	Our Price
Asteroids (cart)	34.95	27.60
Wizard of Wor (cart)	49.95	35.95
Missile Command (cart)	34.95	27.60
Deluxe Invaders (cart)	39.95	28.75
Star Raiders (cart)	44.95	34.60
Gorf (cart)	49.95	35.95
Space Invaders (cart)	34.95	27.60
Ultima II (D)	59.95	43.15
Frogger (D,C)	34.95	25.15
Track Attack (D)	29.95	21.55
Bug Attack (D,C)	29.95	21.55
Temple of Apshai (D,C)	39.95	28.75

☆ IBM	List	Our Price
Deadline (D)	49.95	35.95
Zork I of II (D) ea	39.95	28.75
Galaxy (D)	25.00	18.00
Voyager (D)	25.00	18.00
Temple of Apshai (D)	39.95	28.75
Frogger (D)	34.95	25.15
Conquest (D)	29.95	21.55
Draw Poker (D)	21.00	15.10
Visi File (D)	250.00	195.00
Visi Dex (D)	250.00	195.00
Tax Manager	250.00	180.00
Easy Writer II	350.00	251.95
Super Calc	295.00	212.40

☆ APPLE II	List	Our Price
Deadly Secrets (D)	34.95	25.15
Tunnel Terror (D)	29.95	21.55
Firebug (D)	24.95	17.95
Frogger (D)	34.95	25.15
Cytron Masters (D)	39.95	28.75
Pinball A2-PB1 (D)	29.95	23.35
Wizardry (D)	49.95	35.95
Knight of Diamonds (D)	34.95	25.15
Choplifter (D)	34.95	25.15
S.A.G.A.1,2 or 3 (D) ea	29.95	21.55
Ultima II (D)	59.95	43.15
Deadline (D)	49.95	35.95
Zork I or II (D)	39.95	28.75
Master Type (D)	39.95	28.75
Personal Finance Sys (D)	125.00	90.00
PFS: Report (D)	95.00	68.40
DB Master (D)	229.00	164.85
Wordstar (D) (CP/M)	375.00	230.65

☆ TRS-80		Our Price
Hellfire Warrior (D,C)	39.95	28.75
Death Planet (D)	19.95	14.35
Vaults of Cymarron (C)	39.95	28.75
Lost Colony (D,C)	29.95	21.55
Sargon II (Mod III) (D)	34.95	25.15
Scarfman (Color) (C)	19.95	14.35
Maxi-Stat (D)	199.95	144.00

Cert. Ck., M.O., Visa, M.C., (Incl. card # and exp. date), pers. ck. (add 2 wks). Shipping add $2.00. C.O.D. add $3.00. Wyo. res. add 4% Prices subject to change.

Foreign Orders - 10% of merchandise total (in U.S. currency)

★ FREE PRICE LIST
COMPLETE CATALOG.....$2.00

711 RANGER DRIVE
CHEYENNE, WY 82009
PHONE [307]635-1849

Apple, Atari, TRS-80, IBM and Visicalc are Registered Trademarks.

CIRCLE 235 ON READER SERVICE CARD

Nevertheless, the author starts out with calculator mode, then moves on to input/output, getting information into the program, data, cassette usage, branching, IF, subroutines, strings, subscripted variables, program design, color, and sound. Appendix A gives listings of six programs (mailing list, number conversions, logical functions, color demo, and sound demo). The color and sound demo programs, on cassette, are $7.95 (plus $1 postage). Appendix B gives a simple 20-page backgrounder on data processing, from bytes to logical operators.

Many examples are given; because the text is typed, the author distinguishes between what is typed on the keyboard, and what is read on the TV display, by using a T or R before every line in every example. Monotonous, but it's the easiest way. Exercises are scattered throughout the book.

This is a good guide to VIC-20 programming in Basic, with plenty of helpful examples, and much attention to detail. However, some beginners may get bogged down in the chapter on program design, in which the author felt constrained to get into pseudo-code, which may confuse more than simplify things for some.

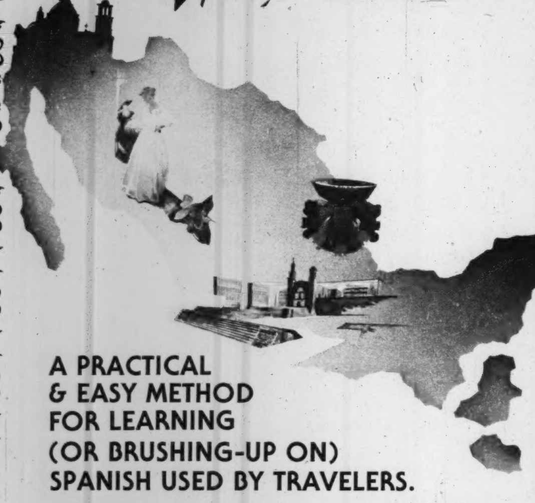
Number Treasury: A Source Book of Problems for Calculators and Computers, by Stanley J. Bezuszka and Margaret Kenney. Dale Seymour Publications, 198 pages, 1982.

Number Treasury is a math teacher's dream book as well as a young mathematician's math book. (All math novices and math phobics should exit here.) It is designed as a resource for high school math teachers and gifted junior high students and contains a wealth of mathematical knowledge. Within its covers, *Number Treasury* provides a quick overview of number theory with concise definitions of everything from prime, perfect and Fibonacci numbers to the lesser known but equally intriguing lucky and happy numbers.

The layout of the book, though not exciting, is consistent throughout. Each section includes an explanation of the laws governing each kind of number, followed by examples and problems to be solved. The predicatability and conciseness are appropriate for the subject matter, and the format makes it very easy for a teacher to skim through the pages and choose problems for students to solve.

One criticism of *Number Treasury* lies in the insinuation of the subtitle that somehow the book relates to computers and calculators. It doesn't. Although it is true that a teacher *with programming knowledge* could direct students in the creation of computer generated solutions to the problems, the book itself makes no mention of how this might be done. A teacher who doesn't know programming would find it impossible to learn or teach anything about computers from the information presented here. It simply was not designed to be used with computers or calculators at all and it is misleading to imply that this is another of the new "computer math" books. *Number Treasury* is, however, a good book. In conjunction with the input of a creative instructor it could be used (with or without computers) very effectively.—*Annie Fox*

SOUTHWESTERN DATA SYSTEMS
PRESENTS
Spanish for the Traveler™



A PRACTICAL & EASY METHOD FOR LEARNING (OR BRUSHING-UP ON) SPANISH USED BY TRAVELERS.

ADVENTURE, FUN, EDUCATION, and history are all reasons people travel to other countries. The problem is, when traveling to countries where little or no English is spoken, how to communicate. By spending a few hours with Spanish for the Traveler, you can gain a basic understanding of Spanish and at the same time provide yourself with a MAGIC KEY which will open doors to the local culture not normally available to the average traveler. In a Latin country, anyone who tries to speak the Language is almost always treated with a smile and warmth by the people of that country. The way to gain this edge is to practice Spanish with Spanish for the Traveler before your trip. . .

Because:

- It's a quick and easy way to learn Spanish useful in traveling.
- It's an opportunity to learn some of the basics of Spanish without the necessity of attending classes, lectures or listening to endless records.
- It's presented in a manner which catches your interest immediately and encourages you to continue building your Spanish vocabulary.
- It provides you with the essentials of Spanish necessary to make your trip as enjoyable as possible. With emphasis on Spanish required for Your arrival, Shopping for Souvenirs, Seeing the Sights, Touring the Country, Dining Out and Getting Acquainted, almost every situation is covered.

Package includes:
diskette, 4 audio cassettes, and take-along manual.

System Requirements:
48K Apple II / II+ with DOS 3.3
and audio casette tape player.

southwestern data systems™
P.O. BOX 582 • SANTEE, CALIFORNIA 92071 • 714/562-3670

CIRCLE 272 ON READER SERVICE CARD

Compu-Guide: A Consumer's Guide to Small Business Computers, by Martha Eischen. Dilithium Press, Beaverton, OR. 164 pages, paperback $14.95. 1982.

Based on the author's one-day seminar titled "Do You Need a Computer?," this slim volume is packed with advice to the person seeking a small computer for business applications.

The author starts out by discussing what a computer can do (save labor, reduce costs, improve work quality, etc.) and can't do (eliminate jobs, reduce personnel, eliminate paperwork, correct current procedures, etc.), asks the reader if he really needs a computer, then gets down to defining objectives, assessing requirements, performing a study, and keeping the staff happy. She pauses to give a chapter on DP terminology, then gets into Choosing the Right System (a look at the various parts of a system), Hardware and Software Contracts, Your System Today and Tomorrow (expandability, transportability, etc.), Installation and Implementation, The Personal Computer, and ends with an appendix consisting of questions to answer, and blanks to fill in with data, as part of a feasibility study.

The book is crammed with common-sense advice and basic information, written very clearly and concisely. Its major drawback is the drawings, which are cartoons in the style of Helen Hoskinson's somewhat confused ladies that once appeared in *The New Yorker*. Many are amusing, but all are poorly drawn, and instead of offsetting what the author (or publisher?) may have felt was rather technical material with a little humor, the cartoons add more of a frivolous touch than anything else. Forget the cartoons—read the book.

An Introduction to Microprocessors: Experiments in Digital Technology, by Noel T. Smith. Hayden Book Co., Rochelle Park, NJ. 182 pages, paperback $10.95. 1981.

The back cover says this is a "learn-by-doing" guide to the use of ICs that "provides a foundation for understanding the underlying hardware actions of programming statements."

The first chapter, an Introduction to Digital Technology, covers the theory and manufacture of integrated circuits, and also tells how to build the breadboard needed to perform the experiments in the subsequent chapters; or you can buy a commercial breadboard.

The first experiments are with logic gates (NOT, AND, OR, NAND, NOR), then you move on to synchronizing circuits (flip-flops, multivibrators, timers, clocks, triggers), clocked logic, data manipulation and display, data processing (with a Motorola MC14500B), and multibit microprocessors (using a Motorola MC6802). Appendixes describe an alternate breadboard design, and provide IC pin-out diagrams that identify which pin connects to what IC input or output line. No indication is given of the cost of the breadboard or ICs required for the 35 experiments.

Smith writes simply and clearly, and goes into great detail. The experiments range from determining the output of an OR gate, to designing a program for BCD subtraction. This looks like an excellent way to get hands-on experience with computer hardware, down at the gate level. ☐

DISK DRIVE WOES?
PRINTER INTERACTION?
MEMORY LOSS?
ERRATIC OPERATION?

Don't Blame The Software!

Pat. #4,259,705

Power Line Spikes, Surges & Hash could be the culprit! Floppies, printers, memory & processor often interact! Our patented ISOLATORS eliminate equipment interaction AND curb damaging Power Line Spikes, Surges and Hash. MONEY BACK GUARANTEE!

- ISOLATOR (ISO-1) 3 filter isolated 3-prong sockets; integral Surge/Spike Suppression; 1875 W Maximum load, 1 KW load any socket $69.95
- ISOLATOR (ISO-2) 2 filter isolated 3-prong socket banks; (6 sockets total); integral Spike/Surge Suppression; 1875 W Max load, 1 KW either bank $69.95
- SUPER ISOLATOR (ISO-3) similar to ISO-1 except double isolation & Suppression $104.95
- SUPER ISOLATOR (ISO-11) similar to ISO-2 except double isolation & Suppression $104.95
- MAGNUM ISOLATOR (ISO-17) 4 Quad Isolated sockets; For ULTRA-SENSITIVE Systems $181.95
- CIRCUIT BREAKER, any model (Add-CB) .... Add $9.00
- REMOTE SWITCH, any model (Add-RS) .... Add $16.00

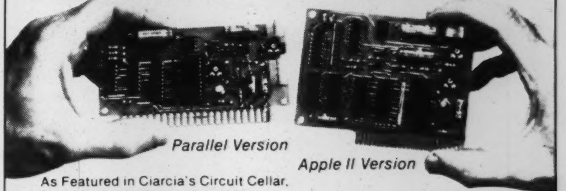
AT YOUR DEALERS

MasterCard, Visa, American Express
ORDER TOLL FREE 1-800-225-4876
(except AK, HI, PR & Canada)

ESP Electronic Specialists, Inc.
171 South Main Street, Box 389, Natick, Mass. 01760
(617) 655-1532

CIRCLE 164 ON READER SERVICE CARD

SWEET-TALKER,
IT GIVES YOUR COMPUTER AN UNLIMITED VOCABULARY.



As Featured in Ciarcia's Circuit Cellar, Byte Magazine, September 1981.

The Sweet-Talker voice synthesizer allows you to add speech of unlimited vocabulary to your computer. Utilizing the Votrax SC-01A chip, you can output any message by programming individual phonemes. Comes in two versions: one plugs directly into your Apple II, the other connects to any computer with an 8-bit parallel printer port. + 12 volts and + 5 volts required for parallel board.

- Contains 64 different phonemes accessed by a 6-bit code.
- Automatic and manual inflection modes.
- Parallel port driven or plug-in compatible with Apple II.
- Super text-to-speech algorithm on disk for Apple II. Makes Sweet-Talker equivalent to units 3 times the cost.
- On board audio amplifier
- Sample program on cassette with Apple II board.
- Optional power supply for parallel board.

ST01	Sweet Talker Parallel Port Board A & T	$139.00
ST02	Sweet Talker Apple II plug in board	149.00
ST06	Text-to-Speech algorithm on disk for Apple II	35.00
SC01A	Votrax Speech Synthesizer chip	70.00
	5 or more	55.00 each
UPS01	Universal Power Supply-A & T	35.00

Add $2.00 for shipping & handling.

To Order: Call Toll Free 1-800-645-3479
(In N.Y. State Call: 1-516-374-6793)
For Information Call: 1-516-374-6793

MICROMINT INC.
917 Midway
Woodmere N.Y. 11598

MICRO MINT

CIRCLE 211 ON READER SERVICE CARD

creative computing RETAIL ROSTER

A DIRECTORY OF STORES AND THE PRODUCTS THEY CARRY

TO PLACE A LISTING CALL COLLECT: LOIS PRICE (212) 725-7226

ALABAMA

VILLAGE COMPUTERS, 1720 28th Avenue South, Homewood, 35209. (205) 870-8943. Apple, Vector, Graphics, Peripherals, Software, Training and Service.

ARIZONA

PHOENIX — HEATHKIT ELECTRONIC CENTER, 2727 W. Indian School Rd. (602) 279-6247. Heath/Zenith Computers, Software, peripherals.

TUCSON — HEATHKIT ELECTRONIC CENTER, 7109 E. Broadway. (602) 885-6773. Heath/Zenith Computers, Software, Peripherals.

SIMUTEK COMPUTER PRODUCTS, 4897 East Speedway, 9881 East Skyview, Tucson, Apple, TRS-80, Xerox, Corvus, Tons of Software, Disk Drive and Printers.

ARKANSAS

ABACUS — 248 Oak St., Conway 72032. (501) 329-9050. Atari, Commodore, Hewlett-Packard. Business/Personal Software, Magazines, Supplies. Free Consultation.

GAME SHOP — Ft. Smith. Computer games for TRS-80/Apple/Atari. 7 days/week.

CALIFORNIA

D.E.S. DATA EQUIPMENT SUPPLY—8315 Firestone, Downey 90241. (213) 923-9361. VICVILLE: (714) 778-5455. Commodore PET, Vic 20 specialists. Latest Software, Hardware, Books, Supplies, Peripherals in stock. In House Maintenance.

OMNI UNLIMITED; 105 S. Los Robles; Pasadena; 91101; 213-795-6664; Commodore, Zenith, Otrona, Victor, Supplies/Peripherals.

ANAHEIM—HEATHKIT ELECTRONIC CENTER, 330 E. Ball Rd. (714) 776-9420. Heath/Zenith Computers, Software, Peripherals.

CAMPBELL—HEATHKIT ELECTRONIC CENTER, 2350 S. Bascom Ave., (408) 377-8920. Heath/Zenith Computers, Software, Peripherals.

EL CERRITO—HEATHKIT ELECTRONIC CENTER, 6000 Potrero Ave., (415) 236-8870. Heath/Zenith Computers, Software, Peripherals.

LA MESA—HEATHKIT ELECTRONIC CENTER, 8363 Center Dr., (714) 461-0110. Heath/Zenith Computers, Software, Peripherals.

LOS ANGELES—HEATHKIT ELECTRONIC CENTER, 2309 S. Flower St., (213) 749-0261. Heath/Zenith Computers, Software, Peripherals.

POMONA — HEATHKIT ELECTRONIC CENTER, 1555 N. Orange Grove Ave., (714) 623-3543. Heath/Zenith Computers, Software, Peripherals.

REDWOOD CITY — HEATHKIT ELECTRONIC CENTER, 2001 Middlefield Rd., (415) 365-8155. Heath/Zenith Computers, Software, Peripherals.

SACRAMENTO—HEATHKIT ELECTRONIC CENTER, 1860 Fulton Ave., (916) 486-1575. Heath/Zenith Computers, Software, Peripherals.

WOODLAND HILLS—HEATHKIT ELECTRONIC CENTER, 22504 Ventura Blvd., (213) 883-0531. Heath/Zenith Computers, Software, Peripherals.

VANGUARD DATA SYSTEMS, 8696 South Atlantic Avenue, South Gate, 90280, 213-564-6402, Mon-Sat, North Star, Televideo, Atari/CPM Software.

COASTAL COMPUTERS, 986 Monterey, San Luis Obispo 93401 (805) 543-9339. Apple, Osborne, Alpha Micro. Software, Peripherals, Supplies. Full Service Center.

P.C. COMPUTERS, 10166 San Pablo Ave., El Cerrito 94530. (415) 527-6044. Commodore Pet, Vic 20 Specialists. In House Maintenance.

LOTUS CENTURY, Westlake Shopping Center (Inside Mini Mall), Daly City, 94015, 415-992-5230. All Major Computer lines discounted.

BEST COMPUTER STORES, INC. 1122 B Street, Hayward 94541. (415) 537-2983. Apple, Compupro, Gimix, Osborne, Otrona, Panasonic.

BYTE SHOP OF HAYWARD, 1122 B Street, Hayward 94541. (415) 537-2983. Apple, Compupro, Gimix, Osborne, Otrona, Panasonic.

COLORADO

DENVER — HEATHKIT ELECTRONIC CENTER, 5940 W. 38th Ave., (303) 422-3408. Heath/Zenith Computers, Software, Peripherals.

CONNECTICUT

COMPUTERWORKS—1439 Post Rd East, Westport 06880; (203) 255-9096. 12-6 Tues.-Fri., 12-8 Thu., 10-5 Sat.

THE COMPUTER STORE, 21 Atlantic St., Stamford, 06901. (203) 356-1920. Apple, Zenith, Sanyo, Diablo, Epson.

THE COMPUTER STORE, 683 Silas Deane Hwy, Wethersfield, 01609. (203) 563-9000. Apple, Zenith, Sanyo, Diablo, Epson

AVON — HEATHKIT ELECTRONIC CENTER, 395 W. Main St. (Rt. 44), (203) 678-0323. Heath/Zenith Computers, Software, Peripherals.

MULTI-BUSINESS COMPUTER SYSTEMS — 28 Marlborough Street, Portland, 06480, 203-342-2747, Complete Commodore Line, Hewlitt Packard, Northstar, Printers, CRT's.

COMPUTERCITY — 1475 New Britain Ave., West Hartford, 06110. (203) 521-2245. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY — 377 Temple St., New Haven, 06510. (203) 562-7546. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

DELAWARE

THE COMPUTER STORE, 4010 Concord Pike, Rt. 202 North, Wilmington, 19803. (302) 478-7772, Apple, Zenith, Sanyo, Diablo, Epson.

MICRO PRODUCTS, 401 Philadelphia Pike, Wilmington, 19809, (302) 762-0227, Major brands of Hardware, Peripherals and over 75 Software lines represented.

FLORIDA

COMPUTERS 101 — 101 Hollywood Fashion Center, Hollywood, FL. 33023. (305) 981-1011. Atari, Zenith, TRS-80, NEC, Xerox, Centronics, Epson, All Printers: Sales and Service. SPANISH SOFTWARE.

HIALEAH — HEATHKIT ELECTRONIC CENTER, 4705 W. 16th Ave., (305) 823-2280. Heath/Zenith Computers, Software, Peripherals.

JACKSONVILLE — HEATHKIT ELECTRONIC CENTER, 8262 Arlington Expressway. (904) 725-4554. Heath/Zenith Computers, Software, Peripherals.

PLANTATION — HEATHKIT ELECTRONIC CENTER, 7173 W. Broward Blvd., (305) 791-7300. Heath/Zenith Computers, Software, Peripherals.

TAMPA — HEATHKIT ELECTRONIC CENTER, 4109 W. Hillsborough Ave., (813) 886-2541. Heath/Zenith Computers, Software, Peripherals.

PROGRAMS UNLIMITED, 2550 Okeechobee Blvd., West Palm Beach 33409, 305-689-1200. Hardware, Software, Peripherals, Magazines, Books. Talk to the pros today.

MICRO COMPUTER SYSTEMS, 144 South Dale Mabry Highway, Tampa 33609. (813) 875-0406, (813) 879-4301. Authorized level 1 Apple Dealer.

NEW WORLD COMPUTERS, De Sota Square, Bradenton, 33505, (813) 748-6494. Sell/Lease, in stock — XEROX, APPLE, COMMODORE, SHARP, ATARI, VECTOR GRAPHICS, OSBORNE, PANASONIC, over 1,000 pieces of software, custom programming, in house repair, HANDS ON EXPERIENCE.

SOUTHERN MICRO COMPUTER, 15945 NW 57th Avenue, Miami Lakes 33014, (305) 621-4137, Discount prices on Apple/Sanyo, Miami area's oldest dealer.

GEORGIA

ATLANTA COMPUTER MART — 5091 Buford Hwy., Atlanta 30340; (404) 455-0647. 10-6 Mon.-Sat.

ATLANTA — HEATHKIT ELECTRONIC CENTER, 5285 Roswell Rd., (404) 252-4341. Heath/Zenith Computers, Software, Peripherals.

MENTOR TECHNOLOGY, 3957 Pleasantdale Road, Atlanta, 30340, 404-447-6236. Atari, Televideo, Sanyo, Altos, C. ITOH Printers and other CP/M Systems.

ILLINOIS

COMPUTERLAND/DOWNERS GROVE — 136 Ogden Ave., Downers Plaza 60515; (312) 964-7762. 10-6 Mon.-Sat., 10-8 Tue., Thurs. Apple, Atari, Osborne, Xerox, IBM Personal Computer, Fortune.

FARNSWORTH COMPUTER CENTER — 1891 N. Farnsworth Ave., Aurora 60505; (312) 851-3888. 10-8 Mon.-Fri., 10-5 Sat. Apple, Hewlett-Packard series 80 systems, HP Calculators, IDS Printers.

LIBERTYVILLE VIDEO AND COMPUTER CENTER; 872 So. Milwaukee Ave; LIBERTYVILLE; 312-367-8660; open 7 days; Atari Computers, Hardware/Software.

THE COMPUTER ROOM, 638 North Michigan, Chicago, IL. 60611. (312) 337-6744. Apple, Televideo, Osborne. Business Program Specialists.

COMPUTER JUNCTION—543 S. York Rd., Elmhurst 60126. (312) 530-1125. Strong support on Apple, Atari, Xerox, NEC. Software/Hardware.

VIDEO ETC., 465 Lake Cook Plaza, Deerfield, 60015, (312) 498-9669. Other locations: SKOKIE (312) 675-3655, Orland Park (312) 460-8980, Buffalo Grove, (312) 459-6677, strong Hard/Software support for Apple, Atari.

DATA DOMAIN OF SCHAUMBURG, 1612 E. Algonquin Rd., Schaumburg, 60195. (312) 397-8700. 12-9 Mon.-Fri., 10-5 Sat. Apple, Osborne Alpha Micro, Osborne, Hewlett-Packard calculators. Largest book and Magazine selection.

COMPUTERS ETC. 2515 West 147th Place, Posen 60469. (South Suburbs of Chicago). Apple, Zenith Hardware/Software/Service. Complete Learning Center.

IOWA

BEACON MICRO CENTER, 213 Lincoln Way, Ames 50010. (515) 233-4807. Apple, Atari, Nec Computers, Peripherals, Software, Service.

KANSAS

GAME SHOP — Wichita. Computer games for TRS-80/Apple/Atari. 7 days/week.

MARYLAND

COMPUTERS, ETC...13A Allegheny Ave., Towson, 21204. (301) 296-0520; 9330 Georgia Ave., Silver Spring, 20910. (301) 588-3748, 257 West St., Annapolis 21401. (301) 268-6505. Apple, Cromemco, Osborne, Northstar, Seequa. Sales/Service/training.

BASIK COMPUTERS INC. 307 North Frederick Avenue, Gaithersburg, 20877, (301) 840-0412, all Hardware/Software compatible with Apple, at discounts.

BALTIMORE—HEATHKIT ELECTRONIC CENTER, 1713 E. Joppa Rd., (301) 661-4446. Heath/Zenith Computers, Software, Peripherals.

ROCKVILLE — HEATHKIT ELECTRONIC CENTER, 5542 Nicholson Lane. (301) 881-5420. Heath/Zenith Computers, Software, Peripherals.

BETHESDA COMPUTERS — 8020 Norfolk Ave., Bethesda 20814. (301) 657-1992. Apple Hardware/Software — Sales/Service/Peripherals and Accessories.

MASSACHUSETTS

SCIENCE FANTASY BOOKSTORE — 18 Eliot St., Harvard Sq., Cambridge 02138; (617) 547-5917. 11-6 Monday-Saturday till 8 Thursday. Apple, Atari, IBM and TRS-80 games.

THE COMPUTER STORE, 120 Cambridge St., Burlington, 01803 (617) 272-8770. Apple, Zenith, Sanyo, Diablo, Epson.

THE COMPUTER STORE, 1678 Mass. Ave. Cambridge, 02138. (617) 354-4599. Apple, Zenith, Sanyo, Diablo, Epson.

THE COMPUTER STORE, 680 Worcester Rd, Framingham, Massachusetts 01701. (617) 879-3720. Apple, Zenith, Sanyo, Diablo, Epson.

THE COMPUTER STORE, 103 Devonshire St., Boston, 02109. (617) 426-4385. Apple, Zenith, Sanyo, Diablo, Epson.

PEABODY — HEATHKIT ELECTRONIC CENTER, 242 Andover St. (617) 531-9330. Heath/Zenith Computers, Software, Peripherals.

WELLESLEY — HEATHKIT ELECTRONIC CENTER, 165 Worchester Ave. (617) 237-1510. Heath/Zenith Computers, Software, Peripherals.

COMPUTERCITY—16 Front Street, Worcester, 01608. (617) 755-5464. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY — Vinebrook Plaza, Burlington, 01803. (617) 273-3146. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY — 420 Rutherford Ave., Charlestown, 02129. (617) 242-3350. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY — Hanover Mall Plaza, Hanover, 02339. (617) 826-9217. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY — 991 Mass. Ave., Cambridge, 02138. (617) 491-4638. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY — 151 Endicott St., Danvers, 01923. (617) 774-7118. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY — 50 Worcester Rd., Framingham, 01701. (617) 875-8126. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

MICHIGAN

COMPUTER CENTER — Garden City; (313) 425-2470 & West Bloomfield; (313) 855-4220; Hewlett-Packard Computers/Calculators, Apple, North Star. Large Selection of Software/Hardware.

MINNESOTA

ABS DATASYSTEMS CORP. — 905 St. Germain, St. Cloud 56301. (612) 253-8734. Ohio Scientific, M/A COM O.S.I., Authorized Distributor.

ST. PAUL — HEATHKIT ELECTRONIC CENTER — 1645 Whitebear, (612) 778-1211. Heath/Zenith Computers, Software Peripherals.

MISSISSIPPI

MISSISSIPPI MICROS, Mart 51, 1700 Terry Road, Jackson, 39204, (601) 948-7846, Apple, Commodore, Atari, Cromenco, Sales and Service.

MISSOURI

CENTURY NEXT COMPUTERS — 1001 E. Walnut, Columbia, 65201; 314-875-8613/2120 Missouri Blvd., Jefferson City, 65101; 314-636-6502 — Apple, Osborne, Atari.

COMPUTER MART — 1904-B E. Meadowmere, Springfield, 65804, 417-862-6500. Apple, Commodore, IMS International, Software, complete Computer Bookstore, Business Specialist.

NEVADA

HOME COMPUTERS — 1775 E. Tropicana #6, Las Vegas 89109; (702) 798-1022. Mon.-Sat. 10-7 Apple, Atari, Hardware/Software, Books & Service.

NEW HAMPSHIRE

COMPUTER MART OF NEW HAMPSHIRE, 170 Main St., Nashua, 03060. (603) 883-2386. THE Apple Specialists. Full line Hardware/Software. Training Service.

COMPUTERCITY — 527 South Broadway, Salem, 03079. (603) 898-2390. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

COMPUTERCITY — 1525 South Willow St., Manchester, 03103. (603) 668-9527. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

NEW JERSEY

SOFTWARE ASYLUM, INC., 626 Roosevelt Ave., Carteret. 07008. (201) 969-1900. M-Sat: 10AM-9PM; Sun: 11AM-6PM. Huge selection for Atari — over 200 programs in stock.

THE COMPUTER UNIVERSE — 155 Route 17S., Paramus 07652; (201) 262-0960. Mon; Wed; Fri., and Sat., 10-6. Tues., and Thurs; 12-9. 23 Rt. 206, Stanhope 07874 (201) 347-7892 Tues. & Thurs. 12-9; Wed., Fri. & Sat. 10-6. Specializing in Apple Computers.

SOFTWARE CITY, PINE BROOK — 101 Rt. 46 East, 07058; (201) 575-4574. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

STONEHENGE COMPUTER CORP., 89 Summit Ave., Summit 07901. (201) 277-1020. 10-6 M.-F., 10-5 Sat. Apple, Canon, Wicat. Authorized Dealer. Sales and Service.

COMPUTERLAND, 35 Plaza, Rt. 4 West, Paramus, 07652. (201) 845-9303. Apple, IBM, Vector Graphic, etc. We know small computers.

COMPUTERS, ETC...Plaza 38 Center, Rt. 38, Cherry Hill, 08002. (609) 779-0023. Apple, Cromemco, Osborne, Northstar, Seequa. Sales/Service/Training.

SOFTWARE CITY, TEANECK — 161 Cedar Lane, 07666. (201) 692-8298. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

SOFTWARE CITY, GREENBROOK — 60 Route 22 West, 08812. (201) 968-7224. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

ASBURY PARK — HEATHKIT ELECTRONIC CENTER, 1013 State Hwy. 35; (201) 775-1231. Heath/Zenith Computers, Software, Peripherals.

FAIR LAWN — HEATHKIT ELECTRONIC CENTER, 35-07 Broadway (Rt. 4), (201) 791-6935. Heath/Zenith Computers, Software, Peripherals.

COMPUTERLAND OF CHERRY HILL — Pine Tree Plaza, 1442 E. Rt. 70, Cherry Hill 08034. (609) 795-5900. Apple, IBM, Fortune.

SOFTWARE MART — 352 Bloomfield Avenue, Caldwell 07006, 201-228-4949. Software for Apple, Atari, TRS-80, Pet. 10-20% off list.

SOFTWARE CITY/SUMMIT — 3 Beechwood Rd., 07901. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off List.

WAYNE SOFTWARE, 1459 Route 23, Wayne Tile Center, Wayne 07470, across from Packanack Center. Computers. Programs. Books. Peripherals. Discount Prices. 201-628-7318.

NEW MEXICO

OMEGA COMPUTER CONNECTION, 8244 Menaul N.E., Hoffmantown Shopping Center, Albuquerque, 87110, (505) 298-5400. Commodore Vic 20 and Victor 9000.

NEW YORK

SOFTWARE CITY, ARMONK — 146 Bedford Rd, 10504. (914) 273-3677. Bus/Rec/Utility Home programs for most microcomputers. Up to 20% off list.

UPSTATE COMPUTER SHOP — RD 1, Box 17A, Whitesboro 13492; (315) 768-8151. 10-6 Mon.-Fri., 11-5 Sat. Apple — Commodore — Data General.

UPSTATE COMPUTER SHOP, 1823 Western Avenue, Albany 12203; (518) 456-3019. Commodore/VIC 20 Specialists.

ADVANCED COMPUTER SYSTEMS, 18 Market St., Potsdam, 13676. (315) 265-5620. Apple, Commodore, O.S.I. and Novell Data Systems.

CASTLE COMPUTERS, 720 New Loudon Rd., Latham, 12110. (518) 783-9405. M-F: 10-6, Sat: 12-5. Apple, Atari Hardware/Software.

COMPUTER WORLD — 4254 N. Buffalo Rd., Orchard Park, 14127. (716) 662-4141. M-F: 9-9, Sat: 9-5. Atari Hardware/Software.

FUTURE VISIONS COMPUTER STORE, 70 Broad Hollow Rd., Rt. 110, Long Island, 11747. (516) 423-7820. Apple, Osborne, Northstar, Ithaca Intersystems.

THE COMPUTER STORE, 221 East Post Rd., White Plains, 10601. (914) 428-1661. Apple, Zenith, Sanyo, Diablo, Epson.

THE COMPUTER STORE, 40 East 52nd St. N.Y.C. 10022. (212) 832-2180. Apple, Zenith, Sanyo, Diablo, Epson.

SOFTWARE CITY, PEARL RIVER — 147 Kinderkamack Rd., Montvale 07645. (201) 391-0931. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

AMHERST — HEATHKIT ELECTRONIC CENTER, 3476 Sheridan Drive., (716) 835-3090. Heath/Zenith Computers, Software, Peripherals.

JERICHO, L.I. — HEATHKIT ELECTRONIC CENTER, 15 Jericho Turnpike, (516) 334-8181. Heath/Zenith Computers, Software, Peripherals.

ROCHESTER — HEATHKIT ELECTRONIC CENTER, 937 Jefferson Rd., (716) 424-2560. Heath/Zenith Computers, Software, Peripherals.

N. WHITE PLAINS — HEATHKIT ELECTRONIC CENTER, 7 Reservoir Rd., (914) 761-7690. Heath/Zenith Computers, Software, Peripherals.

ADS OFFICE SYSTEMS, BOX 3210, Rt. 55, Poughkeepsie 12603. (914) 473-9400. User support: Apple, Hewlett-Packard, IBM-PC.

PROGRAMS UNLIMITED, 20A Jericho Turnpike, Jericho, Long Island 11753. (516) 333-2266. Hardware, Software, Peripherals, Magazines, Books. Talk to the pros today.

PROGRAMS UNLIMITED, Smith Haven Plaza, (Route 347) Smith Haven, Long Island 11755. (516) 724-4490. Hardware, Software, Peripherals, Books. Talk to the pros today.

PROGRAMS UNLIMITED, 131 Mamaroneck Avenue, White Plains 10601, (914) 761-9283. Hardware, Software, Peripherals, Magazines, Books. Talk to the pros today.

SOFTWORLD DISCOUNTS, 2412 Kayron Lane, North Bellmore, 11710, 516-826-6371, Apple, Atari, TRS-80, Software Discounted. Call M-F, 4-10.

NORTH CAROLINA

GREENSBORO — HEATHKIT ELECTRONIC CENTER, 4620 W. Market Street, (919) 299-5390. Heath/Zenith Computers, Software, Peripherals.

PERSONAL COMPUTER CENTER, 2605 Chapel Hill Boulevard, Durham 27707, 919-493-5466, Raleigh 919-833-2240. Full Line of Apple Hardware/Software for Business, Education & Life.

COMPUTER & VIDEO CENTER — 1902 Clarendon Blvd., New Bern 28560. (919) 638-5030. Atari, Northstar, Altos. Specializing in Small Business Systems.

OHIO

ABACUS II — 1417 Bernath Pkwy., Toledo 43615; (419) 865-1009. 4751 Monroe St. (419) 471-0082. 10-6, 10-7 Thurs. Apple, Osborne, Adds, NEC, Atari, Epson & IDS Printers.

NORTH COAST COMPUTERS — 626 Dover Center, Bay Village 44140; (216) 835-4345. 10-6 Mon.-Sat., 10-8 Tue., Thur. Apple/Atari/Vector Graphic/Data General.

PROGRAMS UNLIMITED, Soon to open in Cleveland.

MICRO CONCEPTS, 1655 Brittain Road, Akron, 44310, (216) 633-7740. Commodore, Atari, Onyx, Northstar. Full Service dealer, Classes, Custom Programming.

MICRO LOGIC, 2322 Bethel-Maple Road, Hammersville, 45130, (513) 735-3047, Commodore specialist with Business Models and APF Computers.

BARNHART STORES — 548 N. Main, Urbana 43078. (513) 653-7257. 8AM-5PM. Atari/Commodore at discount prices.

OKLAHOMA

OKLAHOMA CITY — HEATHKIT ELECTRONIC CENTER, 2727 Northwest Expressway. (405) 848-7593. Heath/Zenith Computers, Software, Peripherals.

GAME SHOP — Norman, Stillwater, Oklahoma City, Tulsa. Computer games for TRS-80/Apple/Atari. 7 days/week.

ENID — SPECIALTY ELECTRONICS (405) 233-1632. Atari, Commodore, Texas Instruments. All software/business applications. Open 6 days/week.

PENNSYLVANIA

CALDWELL COMPUTER CORP., 6720 Rising Sun Ave. Philadelphia 19111. (215) 742-8900. Apple, Commodore, Percom, Northstar Sales/Service.

COMPUTERLAND/HARRISBURG, 4644 Carlisle Pike, Mechanicsburg, 17055. (717) 763-1116. Apple, IBM, Xerox, Zenith. Sales, support and training.

ERIE COMPUTER CO., 2131 W. 8th St., Erie, 16505. (814) 454-7652. Apple, Commodore, OSI, Xerox, Atari, Huge inventory of Software.

MARKETLINE SYSTEMS INC., 2337 Philmont Avenue, Huntington Valley, 19006, (215) 947-6670. We sell and service MicroComputers and Peripherals for small business and industry.

STARGATE ENTERPRISES, 1111 Fifth Avenue, McKeesport, 15132, (412) 664-1111, hours: 10-6/Monday-Saturday. Authorized Atari dealer with Atari Information Center.

INTEGRATED MICRO COMPUTER SERVICE, 168 Madison, Rochester 15074, (412) 728-6331, authorized dealer of Atari, also selling Televideo, Quasar, Casio.

THE COMPUTER STORE, THE Philadelphia Center Hotel, Philadelphia, PA. 19103. (215) 567-6475. Apple, Zenith, Sanyo, Diablo, Epson.

20/20 COMPUTER, 2020 Hamilton Street, Allentown, 18104, (215) 439-1800. Atari, Apple, Durango, Hewlett Packard, Data General, Zenith, Televideo. Hardware/Software and Peripherals.

PHILADELPHIA — HEATHKIT ELECTRONIC CENTER, 6318 Roosevelt Blvd. (215) 288-0180. Heath/Zenith Computers, Software, Peripherals.

FRAZER — HEATHKIT ELECTRONIC CENTER, 630 Lancaster Pike, (Rt. 30) (215) 647-5555. Heah/Zenith Computers, Software, Peripherals.

PITTSBURGH — HEATHKIT ELECTRONIC CENTER, 3482 Wm. Penn. Hwy. (412) 824-3564. Heath/Zenith Computers, Software, Peripherals.

COMPUTER FORUM — 490 Lancaster Pike, Frazer, 19355. (215) 296-3474. Commodore/Altos/Atari — Hardware/Software; Epson. Service/Training.

TOYSTORE, 1717 Cochrane Road, Pittsburgh, 15220, 412-343-8809, Whatever is available for the Atari 400/800, Hardware/Software, is here!

CAMERART, The court at King of Prussia, King of Prussia, 19406, (215) 337-2020. CAMERART, opening August 1982, Willow Grove Center, 2500 Moreland Road, Willow Grove, 19090, (215) 657-7272. Apple/Texas Instruments. Sales/Service. For Business Systems Call: (215) 544-8700.

PERSONAL SOFTWARE, 146 Paoli Pike, Paoli, 19355, 215-296-2726. SOFTWARE SPECIALISTS. Custom Programs, Canned Programs and Peripherals.

RHODE ISLAND

THE COMPUTER STORE, 740 North Main, Providence 02904. (401) 331-0220. Apple, Zenith, Sanyo, Diablo, Epson.

WARWICK — HEATHKIT ELECTRONIC CENTER, 558 Greenwich Ave. (401) 738-5150.

COMPUTERCITY — 165 Angell St., Providence, 02903. (403) 331-2187. Apple, Epson, Corvus, NEC, Zenith. Hardware, Software, Peripherals. Service/Training.

UTAH

MIDVALE — HEATHKIT ELECTRONIC CENTER, 58 East 7200 South. (801) 566-4626. Heath/Zenith Computers, Software, Peripherals.

VIRGINIA

COMPUTERS, ETC...6671 Backlick Rd., Springfield, 22150. (703) 644-5500. Apple, Cromemco, Osborne, Northstar, Seequa. Sales/Service/Training.

THE COMPUTER STORE, 6858 Old Dominion Drive, McLean, 22101. (703) 821-8333. Apple, Zenith, Sanyo, Diablo, Epson.

ALEXANDRIA — HEATHKIT ELECTRONIC CENTER, 6201 Richmond Hwy., (703) 765-5515. Heath/Zenith Computers, Software, Peripherals.

VIRGINIA BEACH — HEATHKIT ELECTRONIC CENTER, 1055 Independence Blvd. (804) 460-0997. Heath/Zenith Computers, Software, Peripherals.

SMALL BUSINESS COMPUTER CENTER, 2929 Virginia Beach Boulevard, Virginia Beach, 23452, 804-340-1977. Apple, Vectorgraphics, Alpha Micro, Commodore VIC 20.

WASHINGTON, DC

STARWARE*, Suite 551, 1629 K Street Northwest 20006; (202) 337-5300; everything for the IBM/Software, Hard Discs, Color Printers, Modems, etc...

THE COMPUTER STORE, 1990 K Street N.W., Washington D.C. 20006. (202) 466-3367. Apple, Zenith, Sanyo, Diablo, Epson.

WASHINGTON

SEATTLE — HEATHKIT ELECTRONIC CENTER, 505 8th Ave., N. (206) 682-2172. Heath/Zenith Computers, Software, Peripherals.

TUKWILA — HEATHKIT ELECTRONIC CENTER, 15439 53rd Ave., S. (206) 246-5358. Heath/Zenith Computers, Software, Peripherals.

VANCOUVER — HEATHKIT ELECTRONIC CENTER, 516 S.E. Chaklov Dr., (206) 254-4441. Heath/Zenith Computers, Software, Peripherals.

WEST VIRGINIA

COMPUTERS PLUS, INC., 300 D Street, South Charleston 25303. (304) 744-2321. Atari, Intertec/ Superbrain- Hardware/Software/Service/training.

WISCONSIN

COMPUTERLAND/MADISON — 6625 Odana Rd., 53719, (608) 273-2020; 3205 E. Washington, 53704 (608) 241-2100. Apple, Osborne, IBM-PC, Xerox, Hewlett-Packard, Fortune.

COLORTRON COMPUTERS, 2111 Lathrop Ave., Racine, 53405. (414) 637-2003. Apple, Hardware and Software, C. ITOH Printers. Service/Training.

RETAIL ROSTER growth rate is phenomenal because a listing in these columns produces results way out of proportion to cost. If more of your competitors are in here now, doesn't it make sense that your computer store should be too? Call now — make the next issue.

CREATIVE COMPUTING Readers will respond to your store's listing in the RETAIL ROSTER. Let them know what brands of computer-oriented products you sell; what services you offer. Rates are reasonable . . . success is lasting! Call number listed above for complete information and assistance.

creative computing CLASSIFIED

CLASSIFIED RATES: Per Word, 15 Word Minimum. **REGULAR:** $2.00. **EXPAND-AD®:** $3.00. Ads set in all bold type @ 20% premium. Ads set with background screen @ 25% premium. **GENERAL INFORMATION:** Prepayment discounts available. Payment must accompany order except credit card—Am. Ex., Diners, MC, VISA (include exp. date)—or accredited ad agency insertions. Copy subject to publisher's approval; must be typewritten or printed. First word set in caps. Advertisers using P.O. Boxes MUST supply permanent address and telephone number. Orders not acknowledged. They will appear in next available issue after receipt. Closing date: 5th of the 3rd month preceding cover date (e.g., April issue closes Jan. 5th). Send order & remittance to: Classified Advertising, CREATIVE COMPUTING Magazine, 1 Park Avenue, New York, N.Y. 10016. Direct inquiries to Candi Huggins, (212) 725-3927.

SOFTWARE

EDUCATIONAL SOFTWARE. Grades 1 to 8, home or school use; 24 different packages for most micro computers. Free brochure. RESOURCE SOFTWARE INTERNATIONAL, 140 Sylvan Avenue, Englewood Cliffs, New Jersey 07632, 201-947-6104.

TRS-80 Color, tell your fortune with Matilda the Wizard. Tape $13.50. P.O. Box 381, Owings Mills, Maryland 21117.

TRS-80, APPLE, ATARI — Low prices on Games Software from Acorn and Creative Computing Alber Software — (212) 263-6193. Call for price list.

TRS-80 1/3 SOFTWARE. Games/Education Utility. Free Flyer. TAS INC., 704-CC N. Pennsylvania, Lansing, MI. 48906. (517) 482-8270.

MBASIC SMALL BUSINESS/HOME DATA Management Program for CPM Computers — $25.00. Source listing (19 pages) $15.00. CC Consulting, 1565 East 775 South, 8, Ogden, Utah 84404.

MORSE SOFTWARE FOR APPLE. Receives (no hardware). Transmits. Disk $15.00. Bob Wiseman, 118 St. Andrews, Cincinnati, OH 45245.

RETIREMENT PLANNING — $29.95. for Atari. Advanced financial planning, 20922 Paseo Olma, EL Toro, CA. 92630.

SOLAR HEATING EDUCATIONAL PROGRAM FOR TI/99-4(A) 25 page manual $19.95. on cassette. Send check to: Kuhl Software, 412 15th Ave., S.W. Rochester, MN. 55901.

DATABASE FOR APPLE II Disk 48K system. File maintenance, reporting, update and sort generators. Complete disk based system for only $39.95, Cash or Check. Yang Inc., 985 South Mancos Place, Anaheim, CA 92806.

COMPUTER CONSULTANT

METRO NYC COMPUTER CONSULTANT, over 10 years experience selecting/implementing the correct system for your business needs. Micronomics 212-619-3286.

COMPUTER EQUIPMENT

SAVE 90%, $150.00 for a Z80A system with 64-KB of memory and a real front panel or $200.00 for a 24x80 full function CRT!. Roll your own Technology and save!. FREE DETAILS. Digatek Corporation, 2723 West Butler Drive, Suite 33, Phoenix, AZ 85021.

OPTICAL COMMUNICATOR or Data Link receiver, Transmitter; all electrical parts, lenses, instructions, $9.95 each. Both $18.50. $1.00 postage/handling Specify digital or analog. Peko, Box 5476, Sherman Oaks, CA 91413.

PLUG-INS AND ADD-ONS FOR THE IBM PERSONAL COMPUTER. Available in kit form as well as assembled — Build it yourself and save! Other 8088-Based Products too. Free Information. Compatible Computer Corp. Dept. CC5, Box 51102, Seattle, WA. 98115.

WORD PROCESSING

100,000 WORDS—$125.00. 3/4 megabytes computer media dictionary completely alphabetized in ASCII. ANSI tape, CP/M, RT-11, TRS-80, Apple. All media in stock. CP/M version is directly compatible with SpellStar, and SPELLGUARD, VISA/MC, phone 213-992-0514/write: DIGITAL WORDS, DEPT. C, 22713 Ventura Boulevard, Suite F, Woodland Hills, California 91364.

SPECIAL SERVICES

PETER GIAMALIS — LEGAL SERVICES. 2501 Park Blvd., Palo Alto, California 94306, 415-493-2324, Attorney with Computer and Electronics background. Reasonable fees.

BUSINESS OPPORTUNITIES

ATTENTION MICRO AND MINI COMPUTER OWNERS. Inventive new method of monitoring investments with your computer, will allow you to set up your own office at home, and bring in greater income. Complete package $45. includes postage/handling. Write for information or send Check/Money order to: C.B.A.S., P.O. Box 163, Ontario, Ohio 44862.

"HOW TO MAKE MONEY WITH YOUR HOME COMPUTER." 2 Cassette package with booklet. Send $14.95 plus shipping to: COMPUTER RESOURCES, 1659 Mills Street, CHULA VISTA, California 92010.

PROFIT FROM your interest in home computers. Multi level marketing plan for National Brand Home Computers. No franchise fee or inventory. Write T&T Enterprises, 109 Tee Circle, Salem, VA. 24153.

LAZY Computer? Turn it into a moneymaker! Learn 100 ways to earn money with your computer. Book explains how to find customers — everything needed for success. $6.95 Californians add 6%. Edupub, 7030 Columbine Drive, Carlsbad, California 92008.

COMPUTER CLUB

GOLD COAST COMPUTER RENTAL CLUB — Apple/TRS-80 Software, Firmware, Hardware, Publications. For Free Brochure and details write: Route 1, Bremen, Kentucky, 42325, 502-754-5313.

APF USERS CLUB — Send Self Addressed Stamped Envelope To: COMPU-SWAP, P.O. Box 1373, West Caldwell, N.J. 07006.

COMPUTER HARDWARE

MODEMS—$99.95; Printers—$299.95. Best prices on other Hardware/Software. Computer Discount Services, 448-C W. 55th St., New York, N.Y. 10019. (212) 757-8698; (212) 757-9774.

COMPUTER PUBLICATIONS

POCKET COMPUTER BIMONTHLY NEWSLETTER and program exchange. Sample, $1.50. One year, $12.00. LITTLEk, Box 75, Dubuque, Iowa 52001.

COMPUTER SEMINAR

PERFORMANCE DESIGNS INC. Announces a series of seminars for executives in personal computing. For Dates and Locations, write: Performance Designs Inc., 1411 North Main Street, Box 124, Dept CC., Bluffton, Indiana 46714, (219) 824-5120.

USER GROUPS

FREE Castle Wolfenstein map laminated, with moveable player piece. Clues and hints. JOIN Achtung users group — $5.00 — Box 72, Woodruff, AZ. 85942. (602) 524-6065.

Advertise for $30.00

creative computing CLASSIFIED

Reach 150,000 customers

CALL COLLECT
(212) 725-4299

YOUR Expand-Ad® is more outstanding on a BEN-DAY background like this! Call (212) 725-3927 for more information.

the creative computer mart

SOFTWARE AND HARDWARE SHOPPERS GUIDE

Please Direct Inquiries to: Jim Beloff; (212) 725-4216.

LABELS

2.99 perM

15/16"x3½" 1 up - pin feed

white pressure sensitive

PRICE INCLUDES SHIPPING

Packed 5M per box - Min. order 1 box - $14.95

Check with order - Mass Residents add 5% Sales Tax

CHECK-MATE™

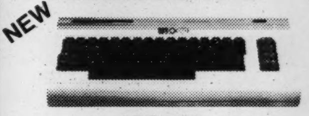
P.O. Box 103, Randolph, MA 02368

Telephone: 617-963-7694

CALL TOLL FREE 1-800-343-7706

NEW

COMMODORE 64



VIC 20

NEC PC-8001 Computer	$759.00
RCA VP-3501 Videotex Data Terminal	$CALL
Scotch 744-ORH Box of 10 SS, SD, O-Sec	$27.00
ADD-ONS:	Videx, Microsoft, TKC, Hayes, Epson, Zenith, Mt. Computer, UMI, NEC, Sony, Games

Mail Order: FUTRA COMPANY

P. O. Box 4380-CC, Torrance, CA 90510

(213) 328-8951 (800) 421-5006

TWX 910 349-6211 AGENFTRA TRNC

Retail: OMC

20695 S. Western Ave. # 124

Torrance, CA 90501

(213) 328-1760

DISKETTES CASSETTES

Error-Free 5¼-inch Diskettes (MD-5) single-sided, soft sector, single or double density, reinforced hub.

Item	Qty 10	Qty 50
MD-5	$25.00	$110.00
C-10	$ 7.50	$ 32.50
C-20	9.00	39.00
C-60	11.50	50.00
C-90	15.00	70.00

UPS SHIPPING INCLUDED in Continental USA

CA Customers add taxes

MICROSETTE

475 Ellis St., Mt. View,
CA 94043 (415) 968-1604

TAKE A BYTE OUT OF YOUR SOFTWARE COST!

Save 20-40% on all major Brands of micro-software and hardware

VISICALC	$175.00
VIDEOTERM	$228.00

90 day guarantee, Product satisfaction guarantee, and Gigantic inventory of old and new releases.

Next Day Shipping by UPS — no per item handling fee.

We are a membership buying service, Member of the Better Business Bureau.

SOFTWARE GALORE

Catalog/Orders call 213-827-1851
National 800-423-6326
P.O. Box 10005 Marina del Rey, CA 90291.

ADVERTISE!

Creative Computer Mart ads really generate sales! $330 each; 6x $315 each, 12x $300 each. Send ad and payment to:

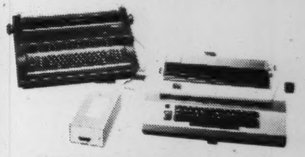
creative computing

CLASSIFIED AD DEPT.
ONE PARK AVENUE
NEW YORK, NY 10016

OR CALL COLLECT:
LOIS PRICE (212) 725-7226

IBM — XEROX — TRS-80 — CBM
HEWLETT-PACKARD — NORTHSTAR
DEC — HEATH — ZENITH — PMC
OSBORNE — OSI — INTERTEC . . .

WE HAVE



THE CONNECTION

Connect your IBM Selectric™, IBM Electronic, or Olivetti typewriter to any Microcomputer.

UNDER $600

ESCON Products, Inc.

12919 Alcosta Blvd.
San Ramon, Ca. 94583
(415) 820-1256

(800) 227-2148

ONE STOP FOR

SINCLAIR ZX81 SOFTWARE

WRITE FOR FREE CATALOG AND FREE PROGRAM LISTING OF MASTERMIND

SOFTSYNC, INC.

P.O. Box 480, Murray Hill Station,
New York, N.Y. 10156
(212) 685-2080

YORK 10

BASF-DPS

WORLD STANDARD TAPE

MONEY BACK GUARANTEE

PREMIUM 5-SCREW SHELL FITS ALL STANDARD RECORDERS

COMPUTER GRADE BLANK CASSETTES

"We monitored the output to the computer with a specially built meter and found absolutely no dropouts throughout the tape . . ."

Stace Papadopoulos
Beaverton, OR

ITEM	1 DOZ.	2 DOZ.
C-05	☐ 7 50	☐ 13 50
C-10	☐ 8 00	☐ 14 40
C-20	☐ 10 00	☐ 18 00
Hard Box	☐ 2 50	☐ 4 00
Soft Box	☐ 2 00	☐ 3 40

Calif residents add 6% sales tax. Shipping 1 doz $2 2 doz $3 50 3 doz $4 50 Each additional doz $ 50

Write or call for QUANTITY DISCOUNTS

for IMMEDIATE SHIPMENT on Credit Card Orders

Call: 213/710-1430

YORK 10 Computerware

24573 Kittridge St , C-1 Canoga Park CA 91307

★MICROCOMPUTER★

BUSINESS SOFTWARE

MEDICAL MGMT...
DENTAL MGMT...
INSURANCE AGENT
LEGAL BILLING.....
PROPERTY MGMT..
AND MUCH MORE !

UNIVAIR INTERNATIONAL

10327 Lambert International Airport
ST. LOUIS, MISSOURI U.S.A. 63145

(314) 426-1099

5¼" Floppy Disk Drives

(Direct IBM® Plug-in)

TANDON Model TM 100-1 .. $199* ea.
TANDON Model TM 100-2 .. $299* ea.
12" Green Phospher Zenith Monitor .. $109* ea.

Also available - TM 602S, 603S, and 603E Winchester Drives.

For info or orders
call — 316-683-9225
or 316-685-9445

MC / VISA or C.O.D. with certified check or money order. Kansas residents add 3% sales tax.

* Plus shipping.

gh computer systems

G-H Computer Systems, Inc.
923 Longfellow Street
Wichita, KS 67207

UNIPROM

THE VERSATILE EPROM HANDLING SYSTEM

- *Reads programs 2704, 2708, 2758, 2508, 2516, 2716 (single supply), 2532, 2732, INTEL'S 2732A and the 8755A (INTEL/NEC) with no personality modules required! All power is derived from the S-100 bus, all signals are S-100 compatible: Port mapping occupies NO memory space.*
- *An on-board wait-state generator allows use with bus clock rates exceeding 6mhz., with no loss in performance.*
- *All software is 8080/8085/Z80 compatible and is fully CDOS and CP/M compatible. Software includes "menu" command. "Intelligent" EPROM read/write and dısk I/O commands, and functions usually found only in "monitors" and "debuggers".*

UNIPROM board (A & T) with extensive documentation, including source listings — $199.00.

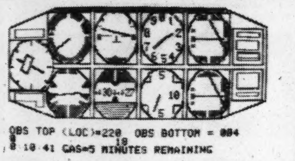
UNIPROM disk-based software with source on disk and listing (specify 5.25" or 8" CDOS or CP/M, or NORTHSTAR 5.25" CP/M) — $38.00.

UNIPROM EPROM-based software (2532) $55.00.

CDOS is a registered trademark of CROMECO, INC.
CP/M is a registered trademark of DIGITAL RESEARCH, INC.
NORTHSTAR is a registered trademark of NORTHSTAR COMPUTER, INC.

CER-TEK, INC.
6020 Doniphan Drive
El Paso, Texas 79932
(915) 581-6697

1982 VERSION IFR SIMULATOR



```
OBS TOP (LOC)=220  OBS BOTTOM = 004
8               10
8 10 41 GAS=5 MINUTES REMAINING
```

APPLE II PLUS 48K DOS 3.3

A real IFR Simulator with X Y Plot and all the good stuff you used to pay $10,000 for. $50.00 at your Computer store, or direct from

PROGRAMMERS SOFTWARE
2110 N 2nd St
Cabot AR 72023
(501) 843-2988.

FREE

business software directory

- Radio Shack's Model I, II, III
- Heath's HDOS
- CPM: Xerox, Alto...
- IBM PC

Data base manager, integrated accounting package, inventory, word processing, and advanced mailing list.

Micro Architect Inc.
96 Dothan St.
Arlington, MA 02174

LEARN

Having trouble learning to use your computer?

Reference manuals don't teach. Most BASIC texts don't cover specific personal computers.

TIS solves these problems with step-by-step books tailored for your machine.

For PET/CBM

Understanding Your PET/CBM $16.95
Vol 1: Basic Programming
PET Graphics .... $ 6.95

For OSI CIP/C4P

Understanding Your C1P/C4P .... $ 9.95
A Workbook of BASIC Exercises

For VIC

Understanding Your VIC $13.95
Vol. 1: Basic Programming

Money Back Guarantee. VISA/MC accepted
All prices include UPS or 1st Class postage

Dealer inquiries invited

TIS INC

Total Information Services, Inc.
Box 921, Dept. CC
Los Alamos, NM 87544

The Quality Leader in

COLOR COMPUTER GAMES

send for our FREE FLYER more coming soon

ARCADE GAMES

Space Invasion
ASTRO BLAST
BERSERK
CAVE HUNTER

Cassette (16k) $24.95
Disc. (32k) $29.95

ADVENTURE GAMES

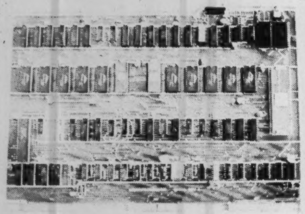
Calixto Island
The Black Sanctum

Cassette (16k) $19.95

Pre paid shipping on domestic orders
Over seas add $3.00
California residents add 6% tax

MARK DATA PRODUCTS
23802 Barquilla • Mission Viejo, CA 92691
(714) 768-1551

NEW! M-68000 SINGLE BOARD COMPUTER



FEATURES:

16 bit Motorola 68000 CPU operating & 10MHz, 20K bytes of on board fast static RAM, 16K bytes of on board EPROM space, 7 levels of prioritied autovectored interrupts, 2 memory expansion buses (up to 256K), 2 serial communication ports (RS-232C), 16-bit bidirectional parallel port, 6800 peripheral accomodation bus, 5x16-bit counter/timers with vectored interrupts, on board real time clock, software compatible with Motorola MEX68KDM board.

PRICE:

Bare board with documentation	$99.95
MEX68KDM compatible monitor in 2764 EPROM's	$120.00
M68000 CPU & memory map PROM	$115.00
Shipping and handling (Domestic)	$3.00
(Foreign)	$15.00

CALIFORNIA RESIDENTS ADD 6% TAX

EMS Educational Microcomputer Systems
(714) 553-0133
P O BOX 16115 IRVINE, CA 92713-6115

VERSACALC!

VERSACALC! VERSACALC! VERSACALC! VERSACALC! VERSACALC! VERSACALC! VERSACALC! VERSACALC! VERSACALC!

T.M.

TUTORIAL
UTILITIES
AND FILE MANAGER
ENHANCEMENTS TO VISICALC®

- **SORT** any number of rows, labels, values, formulas. You select the extent of the sort
- **CONDITIONAL TESTING** to several levels
- **PRINT OUT THE LIST OF COMMANDS**
- **AUTO BATCH UPDATE** e.g. running year-to-date forms
- **MENU—DRIVEN MODULES** for your own application programs
- **AUTO-CATALOG** from within Visicalc
- **AUTO SCREEN FORMAT** saves hundreds of keystrokes

YES! We said, "SORT VISICALC!"

VERSACALC runs within Visicalc.

Versacalc is a trademark of Versacalc Enterprises
Visicalc is a trademark of Visicorp Inc
Apple, Apple II, Applesoft are trademarks of Apple Computers Inc

Apple	100.00
Commodore	125.00
IBM Personal Computer	150.00
Apple ///	150.00

Dealer Demo Disk Available

Anthro-Digital, Inc.
103 Bartlett Avenue
Pittsfield, MA 01201
413-448-8278

SAVE 90%

YES you can save up to 90% on a computer system of your own.

$150.00 buys a 4MHz Z80A with 64KB & a real Front Panel

$200.00 buys a Full Function 24x80 CRT with Keyboard

You can have your own computer and be running Fortran, Basic, Pascal, etc. If you get our

FREE BROCHURE
TODAY

DIGATEK CORPORATION
Suite 7
2723 West Butler Drive
Phoenix AZ 85021

ROLL-YOUR-OWN TECHNOLOGY AND SAVE A BUNDLE

SYNCHRO · SETTE

The Subscription Magazine for
the Sinclair ZX-81/TS-1000
Microcomputers

Games, Educational, Business, Graphics
Tutorial, Etc.

12 Mo. Issues — 6 Bi-Month
CASSETTES
AT LEAST 6 PROGRAMS EACH

$39.50

Ill. Residents add $2.07 tax
outside USA add $10.00

Ask for operator # 383
24 Hr. Hot Line 800-543-1300

THE S & S COMPANY
388 W. Lake Street
Addison, IL 60101
(312) 628-8955

PRICE BREAK
EPSON
MX-80
CARTRIDGE RIBBONS
$9.95 EA.

$107.46 per dozen
Minimum Order 3 Ribbons
Price Includes Shipping
We accept Mastercard and Visa

CHECK-MATE™
P.O. BOX 103, RANDOLPH, MA 02368
Call Toll Free - 1-800-343-7706
In Massachusetts - 617-963-7694

New! FROM Aplogica New!

IBM*
Personal Computer

LASER —
— ZAP

A new sound/graphics game!
Laser zap the aliens as they sweep across the void towards you! Requires 64k & disk BASICa.

$29.95
VISA OR MASTERCARD

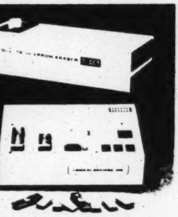
Call toll free now
1-800-547-5995

* TRADEMARK OF INTERNATIONAL BUSINESS MACH. CORP.

UV EPROM ERASER

- Erases over 15 EPROMS - 15 minutes erase time
- Element life 7700 hours
- Intensity 12Ws ½cm² at 1"
- Erases all UV EPROMS (2716, 2732, 2516, 2532, etc.)

$49.95*
* HOBBY MODEL



INDUSTRIAL MODEL
QUV-T8/2N
$68.95

WITH TIMER & SAFETY SWITCH
QUV-T8/2T
$97.50

ABOVE 220VAC 50HZ
QUV-T8/2TE
$109.50

STAND ALONE RS-232 INTELLIGENT PROGRAMMER
PRICE INCLUDES ALL PERSONALITY MODULES
$489.00
PROGRAMS: 2508, 2516, 2532, 2716, 2732, 2732A, 2758, **8748, 8749**

- STAND ALONE, CRT, OR COMPUTER CONTROL
- UPLOAD/DOWNLOAD IN MOTOROLA OR INTEL HEX FORMAT
- MICROPROCESSOR BASED • 4 K INTERNAL RAM
- 90 DAY PARTS & LABOR WARRANTY ON ALL PRODUCTS

- GANG PROGRAMMER
- 2564, 2764 PERSONALITY MODULES

Soon to be released

PHONE ORDERS (305) 776-5870
TWX: 510-955-9496 • WE ACCEPT VISA, MC, CHECKS, C.O.D., MONEY ORDER

LOGICAL DEVICES INC.
781 W. OAKLAND PARK BLVD. • FT. LAUDERDALE, FL 33311
ADD: $4.00 SHIPPING $2.00 C.O.D. CHARGES

NOW AVAILABLE CRT STAND FOR XEROX 820 SAM

FINALLY, A GOOD LOOKING QUALITY STAND ENABLING XEROX 820 USERS TO ELEVATE THE CRT, ALLOWING THE KEYBOARD TO FIT UNDERNEATH THE CRT WHILE IMPROVING COOLING AND HEATING AIR CIRCULATION. TRIANGULAR SHAPED TO GIVE MAXIMUM SUPPORT USING LESS DESK SPACE THAN THE CRT ITSELF. STRONG ENOUGH TO ALLOW USER TO PUT DISK DRIVES ON TOP OF THE CRT, REDUCING DESK SPACE NORMALLY REQUIRED.

THIS STAND MAY BE USED WITH ANY CRT DEVICE AND WILL ELEVATE THE CRT 3⅜", WITH ADDED FLEXIBILITY TO USE VARIOUS SIZED LEVELER INSERTS INCREASING HEIGHT OF STAND.

VINYL WOOD GRAIN FINISH $33.95
XEROX EGG SHELL COLOR $33.95

SEND CASH, CHECK OR MONEY ORDER. VISA AND MASTERCARD BUYERS TELEPHONE TOLL FREE.

COMPUTER PERIPHERALS—MATERIALS COMPANY
P.O. BOX 1045 DEPT CCBG
WOODLAND HILLS, CALIFORNIA 91365
Nationwide 800-428-7825 Ext. 43
CA. Residents Only 800-428-7824 Ext. 43

DEALER AND DISTRIBUTOR INQUIRIES WELCOME.

California residents add 6% sales tax, Los Angeles residents add 6.5% sales tax. Can be shipped UPS, Parcel Post, Weight 2 lbs. In the Continental U.S. add $2.50 postage and handling, $5 elsewhere. Xerox 820 SAM Trademark and product of Xerox Corp. Patent pending CP-M Company 1982.

ATARI* SOFTWARE ADVENTURES AND GAMES

Each adventure takes up to an hour and is programmed with random variables to change the game every time you play.

THE TALISMAN OF POWER

A search through many obstacles for the four keys of Gremlock. Will you get out alive? 16K - $18.95.

THE GHOST TOWER

Find a Magical Gem in a tower haunted with Orcs, goblins, etc. 16K - $16.95.

SUPER SHAPE BUILDER

A graphics game mainly for children from age five. 'Draw' your own pictures with your joystick, in color. 8K - $9.95.

Send Check or C.O.D. - Discs $4.00 extra. *SATISFACTION GUARANTEED*. Write for further information on our GALAXIAN ADVENTURE and other software. Dealer Inquiries welcome. Continental Adventures, 4975 Brookdale, Bloomfield Hills, MI 48013. (313) 645-2140.

* Indicates Trademark of Atari, Inc.

NOW FROM WESTWORLD COMPUTER SUPPLIES, GUARANTEED 100%, ERROR FREE DISKETTES.

- BRAND NAMES ONLY.
- ALL DISKETTES HAVE HUB RINGS AND WRITE PROTECT.
- AVAILABLE IN ALL DENSITIES—ALL SECTORS
- BY DIRECT FROM WHOLESALER

5¼" SS/SD

QUANTITY	BOX
10	21.50
50	20.75
100	19.50

ALSO AVAILABLE AT WHOLESALE PRICES

- PRINTER RIBBONS
- PAPER-AVAILABLE IN MINI PACKS FOR SMALL USERS.

ALL SHIPMENTS SENT WITHIN 24 HOURS.
MASTERCARD AND VISA, CALL NOW OUR TOLL FREE HOT LINE 800-327-1013. IN FLORIDA 305-587-1130

WEST WORLD COMPUTER SUPPLIES
4699 SOUTHWEST 45TH STREET
FORT LAUDERDALE, FLORIDA 33314
DEALERS' INQUIRIES INVITED

HAYES
MICRO MODEM II
FOR THE
APPLE II
$259.* PLUS SHIPPING

VIDEX 80 COLUMN CARD
$237.* PLUS SHIPPING

THE COMPUTER CENTRE
49 NORTH CENTRE STREET
CUMBERLAND,
MARYLAND 21502
301-777-1000

CHECKS, MONEY ORDER,
VISA, MASTERCARD ACCEPTED

CALL US FOR OUR COMPLETE HARDWARE AND SOFTWARE CATALOG!

*PROMOTION RUNNING
FOR A LIMITED TIME ONLY

PREMIUM DATA CASSETTES
* Manufacturers Wholesale Prices *

LENGTH	1 CASSETTE	100-PACK	500-PACK
C-10	.59	.54 ea.	.45 ea.
C-20	.66	.61	.53
C-60	.89	.83	.79
C-90	$1.29	$1.21	$1.14

SOFTWARE PUBLISHERS—Let Acts Audio provide you with all your cassette production requirements.

CUSTOM SOFTWARE DUPLICATION—For Sinclair, TRS-80, Apple, Atari —— Guaranteed to load.

Acts Audio also sells High-Speed duplication equipment modified for software duplication.

ACTS AUDIO, INC.
70 West Illiana Ave,
Orlando, FL. 32806
(305) 423-0338

• index to advertisers •

Reader Service No.	Advertiser	Page
101	Aardvark Technical Services	169
102	Advanced Logic Systems	136
103	Adventure International	80
*	ALF Products	22
104	The Alien Group	265
105	Alpha Byte Computer Products	194-195
106	Amdek Corporation	32
107	Amdek Corporation	118
108	American Small Business Computers	236
109	Apparat	197
311	Apparat	273
110	Apple Computer Corporation	138
111	Applied Software Technology	98
112	Archive	199
113	Armco Insurance Group	211
114	ARCsoft Publishers	231
*	Artworx	225
*	Aspen Software	154
115	Atlantic Cabinet Corporation	288
116	Automated Simulations	77
117	Automated Simulations	135
118	BBI Mail Order	268
119	Beagle Brothers Micro Software	295
120	Big Five Software	2
121	Bit 3 Computer Corporation	289
122	Broderbund	62-63
123	Business Computer Products	288
124	C&C Software	175
125	C&S Electronics, Ltd.	227
126	California Accessory	157
127	Calsoft	189
128	Central Point Software	294
129	Chrislin Data	271
130	Cload Magazine	227
131	Cload Magazine	227
132	Comm Data Systems	261
133	Commodore Business Machines	46-47
134	Commodore Business Machines	Cover 3
135	Compuserve	125
136	Computronics	251
137	Computer Bus	143
138	Computer Discount of America	288
139	Computer Exchange	82-83
140	Computer Mail Order	184-85
141	Computer Plus	297
142	Computer Specialties	193
143	Computer Time Inc.	279
144	Computer's Voice	268
145	Connecticut Information Systems	217
146	Consumer Computers Mail Order	247
147	Corona Data	15
148	Cosmic Corp. Unlimited	165
149	Cottage Software	109
150	Covercraft	289
151	CPU Shop	275
*	Creative Software	240
152	Cybertronics	245
153	Cybertronics	247
154	Datasmith	261
155	Datasoft	23
156	Discount Data Products	191
157	Discount Software Group	187
158	D/Punch Company	232
159	Dresselhaus Computer Products	215
160	Dynacomp	159-161
161	800 Software	99
162	E&L Instruments	209
163	Educational Activities	292
*	Electric Games	239
164	Electronic Specialists	307
165	ETS Centre	303
166	Federal Energy Systems	291
*	Financial Software	175
167	First Star Software	293
168	Fliptrack Training Tapes	291
169	Franklin Computer Corp.	78, 79
170	Frederick Computer Products	265
171	Gladstone	241
172	Gnosis	273
173	Gold Disk Software	16
174	Happy Hands	183
175	Hayden Book Company	114
*	Heath Company	86, 86a, 86b, 87
304	Human Engineered Software	148
176	Huntington Computing	179
177	IBM	94, 95
178	IJG Inc.	117
179	In-Home	231
180	Intec Peripherals Corp.	241
181	Integral Data Systems	91
199	Interpretive Education	115
183	The Intelligent Investor	234
184	Jade Computer Products	219-221
185	Jimscott Inc.	281
186	Kalglo Electronics Co. Inc.	183
187	Kelly's Computing	206
305	Kensington	237
306	Kern	245
189	Last Electronic	292
190	Leading Edge	9
191	Leading Edge	Cover 4
192	Lifeboat Associates	72
193	Lifeboat Associates	281
194	LNW Research	35
195	LNW Research	253
196	Lyco Computer	297
*	Macmillan Book Club	103-105
197	Mark Four Imports	269
198	Maxell	5
200	Memotech	43
201	Merry Bee Communications	60
202	Meta Engineering	303
203	Meta Engineering	305
204	Micro Business World	151
205	Micro Computer Service Center	304
206	Micro D	19
207	Micro House	24-25
208	Micro Lab	108
209	Micro Learningware	236
210	Micro Management	287
211	Micromint, Inc.	307
212	Micro Mountain	229
214	Microstand	279
307	Microstatics	273
215	Microsystems	285
216	Microware Distributing	279
217	Microworks	215
218	Milton Bradley	45
	Mind Systems	10
219	Monument Computer Service	215
220	M-R Information System	60
221	Muse Software	57
222	Muse Software	85
223	National Software	243
224	Nebs Computer Forms	281
225	NEC Information Systems, Inc.	113
226	NEECO	171
227	Newport Machine Design	60
	NRI Schools/Electronics Division	121-123
228	Omega Microware	255
258	Omega Microware	295
230	Omega Sales	213
231	On-Line Systems	58
232	Optimal Technology Inc.	290
255	Orange Micro	173
233	Pacific Exchanges	232
233	Pacific Exchanges	241
233	Pacific Exchanges	268
234	P.C. Magazine	147
235	Peek & Poke Software	305
238	Penguin Software	145
236	Perry Oil & Gas	297
237	Peripheral Unlimited	263
239	Personal Computer Age	163
240	Personal Systems Tech	223
241	Piccadilly Software Inc.	68
242	Practical Peripherals Inc.	Cover 2-1
243	Professional Software	203
244	Professional Software	205
245	Programmers Institute	257
246	Programmers Institute	259
247	Protecto Enterprizes	98
248	Quadram Corporation	235
249	Quality Software	17
250	Quark Engineering	61
252	Qume	101
253	Radio Shack	49-54
254	Radio Shack	141
256	Red Baron	176-177
257	R.H. Electronics	133
229	Rock Roy Inc.	71
259	Royal Software	201
260	Savey	107
261	Sentient	128
262	Silicon Valley Systems	11
*	Sinclair Research Ltd.	39-41
263	Sirius Software	67
264	Sir-Tech	27
265	Sir-Tech	29
266	Softech Microsystems	127-131
267	Software City Inc.	249
268	Software City	90
309	Software Dimension	152
269	Software Street	257
270	Southwestern Data	277
271	Southwestern Data	269
272	Southwestern Data	306
273	Spinnaker Software	12-13
274	SRA	237
275	SRA	240
276	SRA	273
277	Star Micronics	74, 75
278	Stoneware Micro Computer	181
279	Stoneware Micro Computer	259
280	Strategic Simulations	36
281	Strategic Simulations	96
282	Street Electronics Corp.	255
283	Strictly Software	167
284	Sublogic	93
285	Sublogic	126
309	Success Sellers	233
286	Systems Design Lab	261
287	Tecmar Inc.	7
288	Telesoft	65
289	Teleterminal	183
290	Terrapin	110
291	Texas Instruments	64
310	Transnet	304
293	TSK Electronics Corp.	88
292	TYC Software	236
294	Unicom	290
295	United Home Computer	232
296	Valpar	21
297	Videx	142
298	Voyager Software	297
299	Wesper Micro	30
300	Wesper Micro	31
301	Wild Fire Publishing	290
302	XPS Inc.	90

*Write Advertiser Directly.

"DISC DOUBLER PROGRAM"

"DOUBLE THE STORAGE CAPACITY ON YOUR SS/SD OR SS/DD 5¼ INCH DISKETTES."

NOW YOU CAN INCREASE THE SIZE OF USEABLE SPACE ON YOUR SS/SD OR SS/DD 5¼ INCH DISKETTES.

ALL YOU PAY IS A ONE TIME FEE OF $12.95. USE THIS PROGRAM OVER AND OVER, AS OFTEN AS YOU LIKE, NO EXTRA FEES. THIS PROGRAM WILL WORK WITH ALMOST ALL SS/SD OR SS/DD DISKETTES. HURRY, SEND $12.95 U.S., CASH, CHECK, OR MONEY ORDER. VISA AND MASTERCARD BUYERS TELEPHONE TOLL FREE.

DISK DOUBLER PROGRAM
CP-M COMPANY
P.O. Box 1045 DEPT. CCO
WOODLAND HILLS, CALIFORNIA 91365
Nationwide 800-428-7825 Ext. 43
CA. Residents Only 800-428-7824 Ext. 43

California residents add 6% sales tax, Los Angeles residents add 6.5% sales tax. Please include $1 postage and handling. All orders shipped within 10 days. Disk doubler program copyright 1982 by computer peripheral-material company.

Sinclair ZX81 Software on cassette.

MULTIFILE Data Storage System. A versatile multi purpose filing system for 16K ZX81. Menu driven. The number, size and heading of files are user definable. Files may be created, modified, replaced, and searched, and are protected by a security lock. Output to ZX printer is provided. MULTIFILE is supplied on cassette with three blank cassettes for data storage, and packed in an attractive permanent storage case. Supplied with extensive documentation describing applications for both business and personal use. **$29.95**

ZXAS Machine Code Assembler (16K) **$9.95**
ZXDB Machine Code Disassembler/Debugger (16K) **$9.95**
ZX CHESS! Your choice of 7 levels of play, white or black, set up any position to be analyzed, change levels of play during a game, swap sides, and more (16K) **$24.95**
INVADERS! Ten levels of play! (16K) **$9.95**
STARTREK Trek across the galaxy (16K) **$9.95**
ADVENTURE: Damsel and the Beast (16K) **$14.95**
1K PROGRAM PACK. 8 compact, entertaining programs **$9.95**
16K PROGRAM PACK. Four entertaining programs **$9.95**
10 EXCITING ZX81 PROGRAMS **$14.95**

Books
30 Programs for the ZX81 (1K) **$14.95**
Understanding Your ZX81 ROM **$19.95**
ZX81 ROM Disassembly Part A **$14.95**
Full replacement warranty all tapes
Write for our FREE SOFTWARE CATALOGUE for ZX81

GLADSTONE

Gladstone Electronics 901 Fuhrmann Blvd. Buffalo NY 14203
Telephone Orders (716) 849-0735 VISA MC No C.O.D.s please

Mail Orders: Send check, money order, Visa or MC number
$1.50 per order handling

N E W

COMPUTER MART FORMAT
3" x 2"

PICTURE YOUR AD HERE!

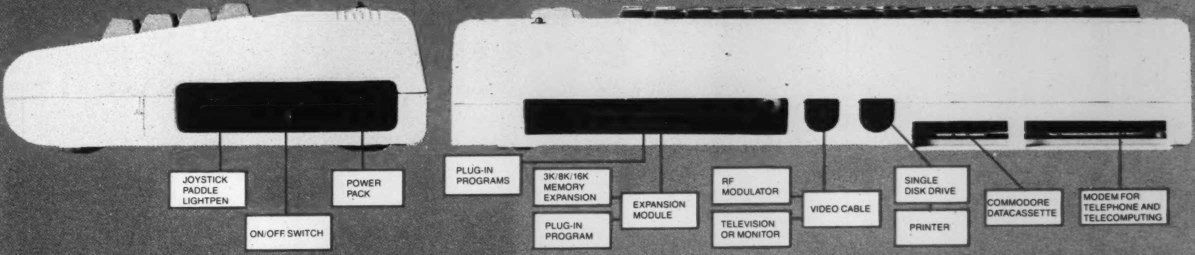
NEXT CLOSING DATE:
SEPTEMBER 1

COMMODORE VIC-20®

"THE WONDER COMPUTER OF THE 1980s. UNDER $300."

—WILLIAM SHATNER

"The best computer value in the world today. The only computer you'll need for years to come."


JOYSTICK
PADDLE
LIGHTPEN
ON/OFF SWITCH
POWER PACK
PLUG-IN PROGRAMS
3K/8K/16K MEMORY EXPANSION
PLUG-IN PROGRAM
EXPANSION MODULE
RF MODULATOR
TELEVISION OR MONITOR
VIDEO CABLE
SINGLE DISK DRIVE
PRINTER
COMMODORE DATACASSETTE
MODEM FOR TELEPHONE AND TELECOMPUTING

VIC-20® VS. OTHER HOME COMPUTERS

Product Features	Commodore VIC-20	Atari® 400™	TI® 99/4A	TRS-80® Color Computer
Price*	$299.95	$399.00	$454.00	$399.00
Maximum RAM Memory	32K	16K	48K	32K
Keyboard Style	Full-Size Typewriter Style	Flat Plastic Membrane	Full-Size Typewriter Style	Calculator Style
Number of Keys	66	57	48	53
Programmable Function Keys	4	0	0	0
Graphic Symbols On Keyboard	62	0	0	0
Displayable Characters	512	256	192	256
Microprocessor	6502	6502	TMS9900	6809
Accessible Machine Language	YES	YES	YES	YES
Upper/Lower Case Characters	YES	YES	YES	NO
Operates with all Peripherals (Disk, Printer and Modem)	YES	NO	YES	YES
Full Screen Editor	YES	YES	YES	NO
Microsoft Basic	Standard	N/A	N/A	$ 99.00
Telephone Modem	$110.00	$399.95	$450.00	$154.95

*Manufacturer's suggested retail price Mar. 1, 1982

VIC SUPER ALIEN

SARGON II CHESS

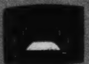
FIVE ADVENTURE GAMES

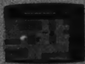
DRAW POKER

PERSONAL FINANCE I AND II

WORD PROCESSOR & TYPING PRACTICE

EXPENSE CALENDAR


MIDNIGHT DRIVE/ROAD RACE


RADAR RATRACE

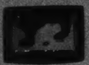
CAR CHASE

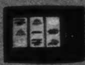
CASINO-STYLE BLACKJACK

SPACEMATH

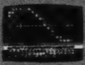
LOAN & MORTGAGE CALCULATOR

HOME INVENTORY


JUPITER LANDER

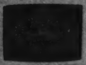

SUPERSLOT

VIC AVENGER


BIORHYTHM/ COMPATABILITY

BLUE MEANIES FROM OUTER SPACE

SLITHER/ SUPERSLITHER


VIC-20 SUPER EXPANDER

Read the chart and see why COMPUTE! Magazine[1] calls the VIC-20 computer "an astounding machine for the price." Why BYTE[2] raves: "...the VIC-20 computer unit is unexcelled as a low-cost consumer computer." Why Popular Mechanics[3] says "...for the price of around $300, it's the only game in town that is more than just a game." And why ON COMPUTING INC.[4] exclaims: "What is inside is an electronic marvel... if it sounds as if I'm in love with my new possession, I am."

The wonder computer of the 1980s. The VIC-20 from Commodore, world's leading manufacturer of a full range of desktop computers. See the VIC-20 at your local Commodore dealer and selected department stores.

[1] April '81 issue [2] May '81 issue [3] November '81 issue [4] Fall '81 issue

VIC-20
commodore
COMPUTER

CIRCLE 134 ON READER SERVICE CARD

Commodore Consumer Products Division
487 Devon Park Drive, Wayne, PA 19087
Canadian Residents: Commodore Computer Systems
3370 Pharmacy Ave., Agincourt, Ont., Canada, M1W 2K4

Please send me more information on the VIC-20.

Name____________________

Address____________________

City__________ State______ Zip______

Phone____________________

CC-10

REMEMBER:

ELEPHANT
MEMORY
SYSTEMS
"NEVER
FORGETS."

MORE THAN JUST ANOTHER PRETTY FACE.

Says who? Says ANSI.

Specifically, subcommittee X3B8 of the American National Standards Institute (ANSI) says so. The fact is all Elephant™ floppies meet or exceed the specs required to meet or exceed all their standards.

But just who is "subcommittee X3B8" to issue such pronouncements?

They're a group of people representing a large, well-balanced cross section of disciplines—from academia, government agencies, and the computer industry. People from places like IBM, Hewlett-Packard, 3M, Lawrence Livermore Labs, The U.S. Department of Defense, Honeywell and The Association of Computer Programmers and Analysts. In short, it's a bunch of high-caliber nitpickers whose mission, it seems, in order to make better disks for consumers, is also to make life miserable for everyone in the disk-making business.

How? By gathering together periodically (often, one suspects, under the full moon) to concoct more and more rules to increase the quality of flexible disks. Their most recent rule book runs over 20 single-spaced pages—listing, and insisting upon—hundreds upon hundreds of standards a disk must meet in order to be blessed by ANSI. (And thereby be taken seriously by people who take disks seriously.)

In fact, if you'd like a copy of this formidable document, for free, just let us know and we'll send you one. Because once you know what it takes to make an Elephant for ANSI . . .

We think you'll want us to make some Elephants for you.

ELEPHANT.™ HEAVY DUTY DISKS.

For a free poster-size portrait of our powerful pachyderm, please write us.
Distributed Exclusively by Leading Edge Products, Inc., 225 Turnpike Street, Canton, Massachusetts 02021
Call: toll-free 1-800-343-6833; or in Massachusetts call collect (617) 828-8150. Telex 951-624.

CIRCLE 191 ON READER SERVICE CARD